TECHNOLOGY

The CHEMICAL AGE

VOL LIX 14 AUGUST 1948 No 1518

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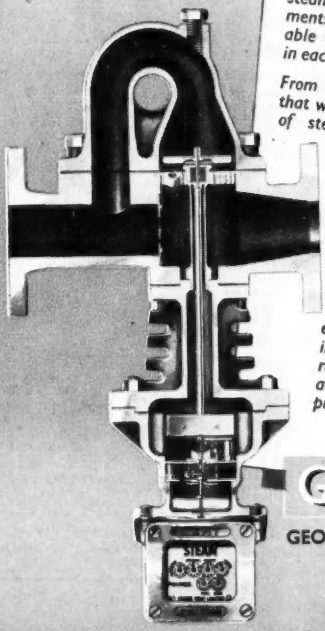
DETROIT

STEAM ECONOMY

After fitting this simple meter, steam consumption was reduced from 70,000 lb. of steam per week, to 50,000 lb.

The following are extracts from a letter from Messrs. William Hutchinson (Yarns) Ltd., of Holybrook Mills, Bradford :



The steam meters enabled us to check steam consumption in our various departments : taking weekly readings we are able to ascertain the efficiency of the plant in each section.

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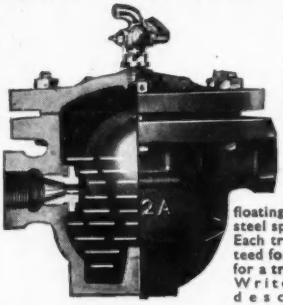

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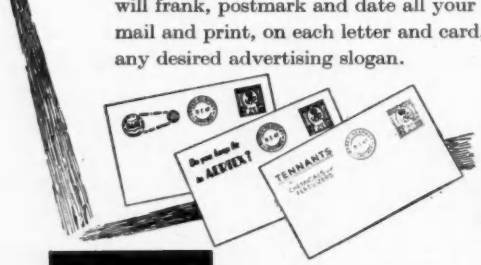

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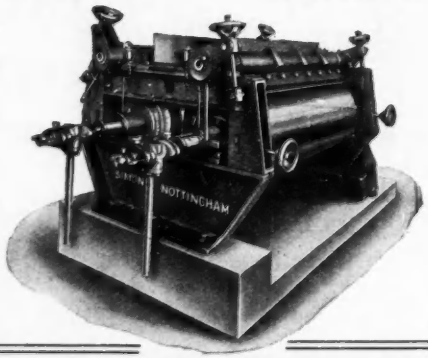

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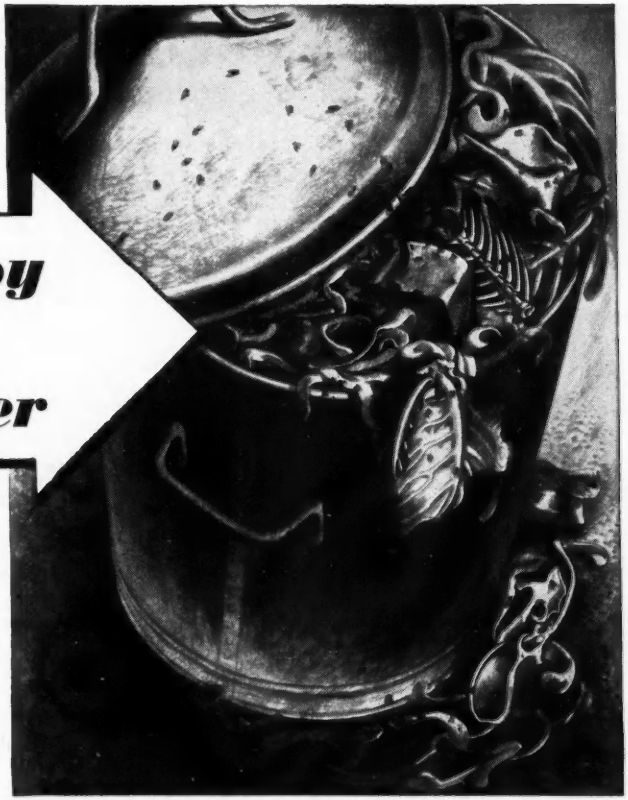

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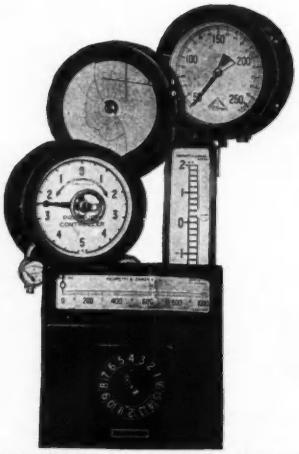

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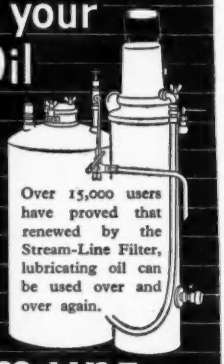

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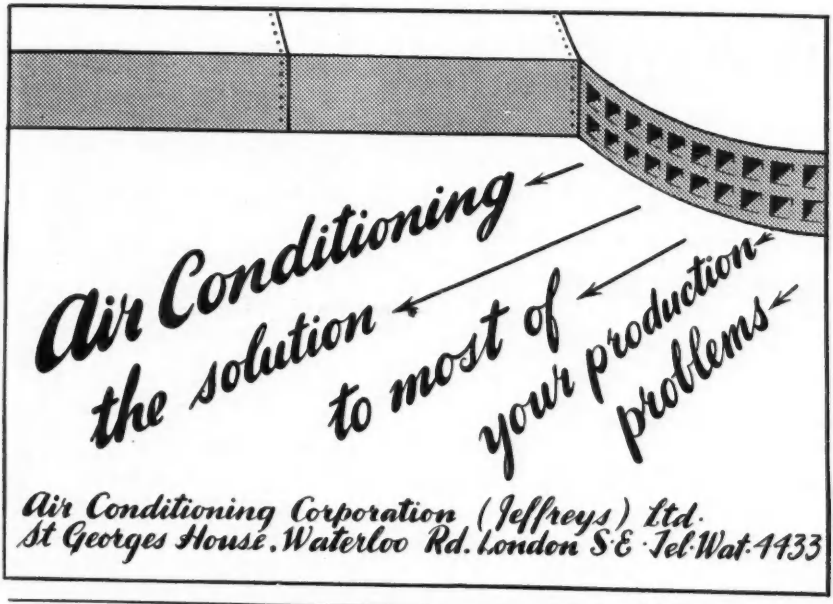

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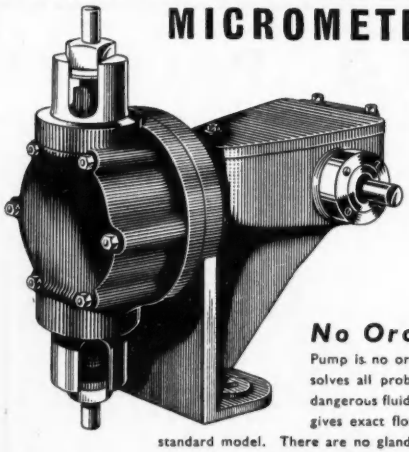

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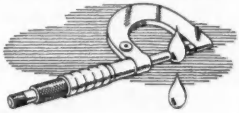

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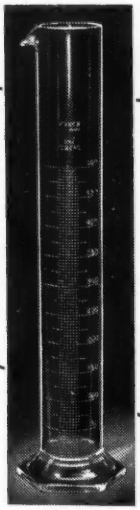

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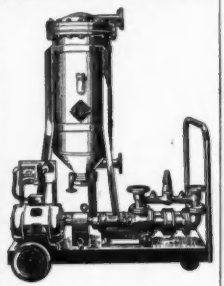

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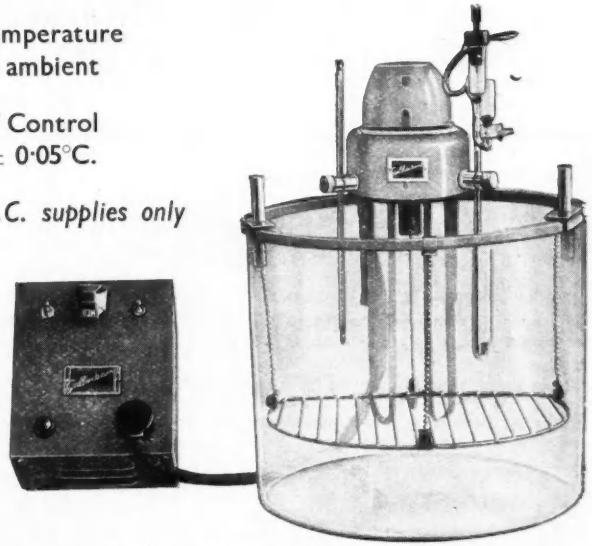

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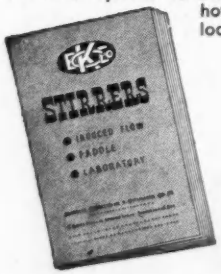

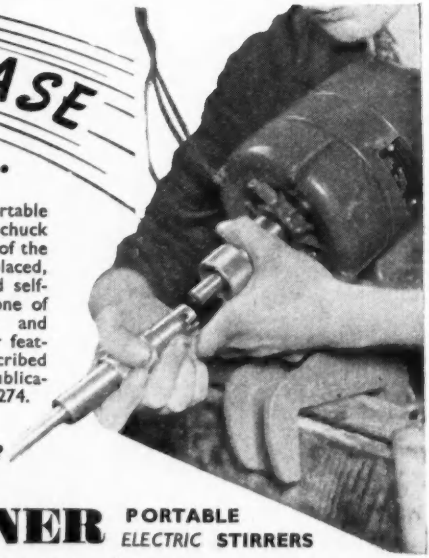

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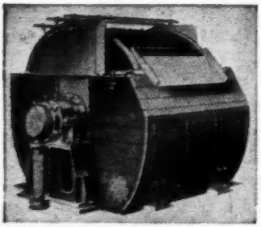

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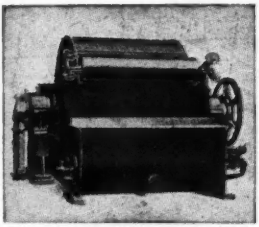

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THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LIX
No. 1518.

14 August 1948

Annual Subscription 26s.
8d. per copy, post paid, 10d.

A Bid for Better Coal

THE chemical industry is dependent for most of its operations on coal in the form of power, steam, electricity or the hot products of combustion. It is from that standpoint that the importance of some recent official pronouncements upon the coal position must be assessed. The report of the National Coal Board, with its rather depressing account of the operations of 1947, has been the subject of wide comment. While it contained depressing features associated with the great financial loss, increases in the price of coal, and inability to persuade the miners to increase output regardless of considerable increases in mechanisation, it was also a record of a vast adventure in reconstruction. It reflected at least a promise that the coal industry as a whole will ultimately be run upon the soundest technical lines, when some fundamental changes can be made and a great deal more equipment provided. That promise is not one which can be quickly fulfilled and, even more evidently, no assurance of any kind can be had that the mining force will enable the commendable plans of the board to come to fruition.

A document to which far less attention has been paid is the annual report of the Industrial Coal Consumers' Council which was issued towards the end of July. There can be few works where the coal supplies have not frequently been an invitation to despair. The Industrial Coal Consumers' Council is charged with the duty of considering any matter affecting the sale or supply of solid fuel which is brought to its notice by consumers; if action appears to be necessary the conclusions of the council are notified to the Minister, who can then take action if he deems its desirable. If a really bad consignment of coal has been received, the report states, " the proper course is to take the matter up first with the supplier and then with the National Coal Board, if necessary. Only if the board fails to give satisfaction and there is a suggestion of unfair treatment or some other question of principle, will the matter be considered by the council. Such reports must be documented and preferably should be made through the consumer's trade association." If the difficulty is one of allocation of supplies, a firm may appeal first to " the regional controller of its parent production department, and any non-industrial consumer to the regional controller, or senior regional officer of the Ministry of Fuel and Power." No one will see in this programme of permissive powers and conditional safeguards any immediate solution of coal users' difficulties, but the creation of remedial procedure does at least recognise the widespread need.

The adequacy of supplies of coal is a matter of the first importance. The NCB has announced that output is falling short of the target set for the mining industry. The Minister informed the country in June that on this account there will be a higher proportion of inferior coal supplied to industrial consumers in this country

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than in the past. The Consumers' Council regards the provision of adequate supplies as important not only to prevent interference with industrial production but because it enables the consumer to choose the quality of coal which will suit his appliance. The supply of coal of the right size and ash content for any particular purpose enables that coal to be used with greater efficiency and increases the output of the plant. One means of economising in the use of coal is therefore to supply coal suitable to the consumer's purpose. The council points out that "high ash coal can be used efficiently if the quality and consistency can be assured over a reasonable period." It may be better to adapt or instal plant designed to consume high-ash coal, for some purposes, than to clean such coal.

This introduces the question of quality, a matter second only to quantity, and, as we have indicated, having a bearing on the work that can be done by a given weight of the stuff that is paid for as coal. An important pointer for those who are proposing to instal new coal burning plant is that, with the increasing use of machines in the mines there is likely to be a higher proportion of the smaller sizes in future coal output.

The Report of the NCB indicated that 45 new coal preparation plants with a capacity of about 14 million tons of coal a year are operating, under construction, or ordered from manufacturers, and that a further 140 new coal preparation schemes are under consideration to deal with about 60 million tons of raw coal annually. It would seem that the ash content of coal is being tackled seriously and comprehensively by the NCB and that a considerable improvement should result in the course of the next two or three years. Meanwhile, all industrialists will subscribe heartily to the conclusions of the Industrial Coal Consumers Council that: "We cannot over-emphasise the importance, as a long-term policy, of supplying each consumer with those grades and qualities of fuel which can be used with maximum efficiency in the particular plant." The provision of cleaner coal is an effective means of increasing the capacity of existing plant, but low-ash coal is not necessarily required by all users and may be unwelcome where coal is burnt on grates. The final conclusion of the council is that "in many directions, and especially from the long-term aspect, there is a limit beyond which the cleaning of coal may be so expensive as to justify the provision of consumer's plants for the use of low grade fuel. It is important that this should be borne in mind and that consumers should be given the earliest possible guidance as to the types of coal that will be available in future, so that they can plan accordingly."

NOTES AND COMMENTS

To Czechoslovakia

WHAT fate befalls the chemical industries of a country which adopts most of the harsh tenets of Moscow continues to be one of those subjects about which the official information services are uniformly uninformative. Few countries have undergone such profound political and economic changes as have occurred in Czechoslovakia since a goodwill mission from its chemical industry visited this country in March last year. The Association of British Chemical Manufacturers, which received the Czech chemical manufacturers on that occasion, now has the opportunity of seeing a little of what goes on " behind the curtain," having accepted a cordial invitation sent on behalf of the Czechoslovakian chemical industry to pay a return visit. The mission will leave here by air on September 17, fortified with the blessings of the Foreign Office and the Board of Trade and, more practically, by the presence of Dr. George Lewi as their liaison officer. Whatever the political climate may be, they will probably find in Czechoslovakia some of the more important factors influencing the future of chemical affairs on the Continent. The production there last year of more than 190,000 tons of sulphuric acid, over 470,000 tons of phosphatic and nitrogenous fertilisers and some 24,000 tons of dyestuffs testifies that the chemical activities, 92 per cent of which are now said to be State undertakings, are not mere exercises in political theory. A more typical indication of this widening activity was the notification last week from Prague of the reduction or elimination of import duties until the end of the year on a long list of chemicals, almost entirely of the basic kind.

Sulphuric Acid Figures

PRODUCTION of sulphuric acid and oleum in the three months ended June 30—398,744 tons—represented a reduction of 5251 tons on the total recorded in the first quarter of the year. That is one of the facts disclosed by the summary of manufacture and uses of the material upon which so wide a range of chemical and other industries depend, issued by the National Sulphuric Acid Association. This is one of those collections of statistics in which wide fluctuations are usually indicative of instability in some of the most essential industries and the relative uneventfulness of the present record, apart from the not very significant reduction in the quantities of acid produced and used, is welcome. The reduced output is shown to have occurred in the chamber produced acid, which was some 6000 tons less, and this was partly offset by a small rise in the output from the contact process Among the larger users a small falling off, in proportion to the large quantities represented, is shown to have taken place in the fertilisers industry, sulphate of ammonia and superphosphates, whose requirements, however, are more immediately a reflection of seasonal influences than of industrial affairs. Proportionately a larger change was the reduction by over 3000 tons of the amount of acid taken up by the rayon and transparent paper industries.

Earnings " Nationalised "

ONCE again in recent weeks the cry has gone up that the chemical and engineering industries must become State enterprises. The proponents are among those taking part in the Labour Party conference and the project is supposed to be high in the programme which some sections are urging upon the Government. Such projects must appear highly unrealistic to any who have consistently noted the evidence which one annual company report after another has presented of the contribution made by all the heavy industries to the national exchequer. In that respect these undertakings have been " nationalised " for some years, with the important distinction that, unlike the activities controlled by Government boards, they still yield a huge harvest to the Chancellor of the Exchequer. The trading results of Babcock & Wilcox, Ltd., recently discussed by the chairman, Lieut.-Col. Sir John Greenly, are typical of many in revealing how disproportionately large a share of profits are transferred to public funds : out of a total available balance of £960,755 resulting in 1947 more than 50 per cent—£499,741—was paid in taxation. Stockholders will get what is left, some

£363,000. The Babcock & Wilcox board, like most others, has "limited" dividend distribution. The remarkable thing is that by much enterprise and hard work it is still possible to set aside any adequate sum after satisfying the huge demands for taxation and plant maintenance, of which the latter required in the last two years £1.3 million.

Dispersed Ownership in Germany

THE complete change of outlook on what should be done with German chemical industry, since a four-Power commission in 1946 undertook responsibilities resembling those of a demolition party, is mirrored in the announcement last week that plans have been completed for transferring to German authorities the administration of all the I. G. Farben assets in the Anglo-U.S. zone. Soon a German panel will undertake the task of putting into effect the British and American intention that this overwhelmingly large proportion of German chemical industry should continue to operate under "dispersed ownership." The French authorities have been invited to take equivalent action in anticipation of the ultimate merger of the three zones. It is interesting to note that the final rejection of the unrealistic doctrine held earlier, aimed at the almost total destruction of Germany's chemical potential, implements some of the recommendations made long ago by representative chemical manufacturers in this country, who might excusably have supported the opposite view—that such powerful commercial adversaries of the past should be permanently eliminated.

Rumour and Propaganda

BUT for the distrust between nations which has been one of the legacies of war, and the consequent perpetuation of the secrecy which has barred the interchange of so much essential information, the facts about the I. G. Farben disaster at Ludwigshaven would now be widely known. That is obviously desirable, not merely to end speculation, but to ensure that any profitable lesson which that tragic event has to convey to others should be made widely known while the need to safeguard against a repetition elsewhere is keenly recognised. The prospect of any full and frank revelation of the circumstances in which at least 178 are known to have lost their lives seems now almost as ephemeral as the hope of free discussion of nuclear fission. Even the number of lives lost, since the first greatly exaggerated reports, has for long been uncertain, and the extent of the physical damage, which the German radio says may have amounted to £3.75 million, is still apparently a security matter. These things perhaps are of less immediate importance than the identification of the circumstances and materials by which such an inferno was created, and about this any willingness on the part of the French authorities has been discouraged by the hostile propaganda the Soviet authorities have hastened to concoct round the alleged reports of survivors that the French were developing fuel for jet-propelled rockets. While the French have denied this and invited Russian pressmen to investigate, the whole tragic affair seems now to have been removed to a plane where the claims of scientific safeguards and human preservation are not heard.

A NEW STEEL RECORD

ANNOUNCING the July steel output, the British Iron and Steel Federation stated this week that the present annual rate of production is 14,723,000 tons, which is well above the recently increased 1948 target rate of 14,500,000 tons.

Although July is the industry's heaviest holiday month, the weekly average of 294,700 tons reached during this period, while less than the previous month, compares favourably with the weekly average of 211,700 tons in 1947.

For the second quarter of 1948 the weekly average production figures were 294,700 tons and the annual rate 15,323,000 tons, compared with the 1947 second quarter figures of 244,100 and 12,694,000.

Pig iron production in July was at an annual rate of 8,908,000 tons, compared with 7,460,000 tons a year ago. Figures for the second quarter were: 1948, weekly average 182,000 tons; annual rate 9,464,000 tons; 1947, 141,600 tons and 7,362,000 tons.

The July issue of the federation's monthly bulletin discloses that the heavy drain on stocks of pig iron and scrap has now ended and, in the second quarter of 1948, stocks were increased.

Another Refinery for the N.E. Coast

Reported Use of State Compensation Payment

PLANS for the establishment of a £3 million oil refinery in the Newcastle area were outlined last week by the Mayor of Halifax (Alderman C. Holdsworth) and his son, Mr. Donald Holdsworth.

The Mayor, and his business partner, Mr. Robert Hanson, have just received £2,277,833 from the Ministry of Transport as part payment for their shares in the Holdsworth-Hanson group of transport industries, now transferred to State control.

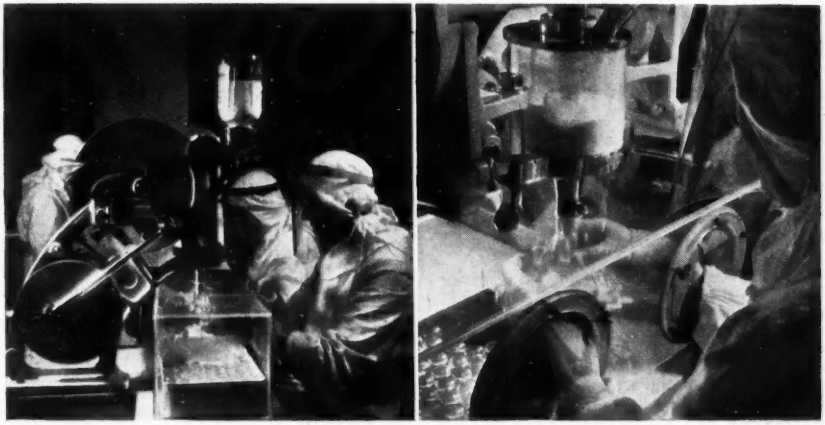
"The money is going to be put to good use," said Alderman Holdsworth. "Plans have been passed for the building of an oil-refinery on the North-East Coast with full Government backing. It will take two or three years to build, and we may go to the public for a flotation."

Mr. Donald Holdsworth said that a start had already been made on the project but completion would depend upon the availability of steel supplies.

Early last June a 46-acre site at Low Flatworth Farm, near Northumberland Dock, North Shields, was reported to have been selected by an oil development company for its oil refinery scheme. The plant, it was then stated, would be the first of its kind to be established on Tyneside, and would eventually employ 300.

BRITISH "HOME GROWN" STREPTOMYCIN

THE first visible evidence of the successful completion of a project which was conceived in 1944, when Dr. Waksman revealed his findings on the production and potentialities of streptomycin, is contained in the pictures reproduced here. They were taken recently at Glaxo Laboratories, Ltd., Greenford, Middlesex. They reflect the new commercial production and distribution in this country of streptomycin—the first pictures of their kind—and illustrate incidentally the exacting level of clinical safeguards involved in the proper handling at all stages of such antibiotics. Their production was based on prolonged experimental work with pilot plant at the company's establishment at Barnard Castle, Co. Durham, where latterly the deep fermentation process on a large scale has been in progress. This production, it is anticipated, will be greatly increased when the new Glaxo plant at Ulverston, Lancs., is put into operation.



Left, above: Workers at Greenford, filling streptomycin vials under highly aseptic conditions; all wear surgical gloves, face shields and are swathed in sterile gowns. Right: The rubber "valves" to the filling cabinets safeguard against the risk of air-borne contamination

More Basic Chemicals Used in June

Small Reduction in Non-Ferrous Metals and Rubber

A SMALL reduction in employment in the principal chemical and related industries is recorded as having taken place in May in the *Monthly Digest of Statistics* No. 31, July) of the Central Statistical Office. Workers in chemicals, explosives, coke oven and by-product works numbered 242,100 in May, approximately 1000 fewer than in the previous month.

The recent steady increase in the number occupied in the production of oils, paints, varnishes, etc., was maintained, bringing the total to 80,600.

The probability that the fewer numbers employed may have been rendered possible by more economical use of manpower is supported by the record of generally increased use in June of most basic chemicals, as compared with June, 1947. The opposite tendency is exhibited by the figures for non-ferrous metals, as a whole, and waste and natural rubber.

The principal categories are as follows :—

	May, 1948 Thousand Tons			*May, 1947* Thousand Tons		
	Production	*Consumption*	*Stocks*	*Production*	*Consumption*	*Stocks*
Sulphuric acid	127.4†	125	58·2†	110·0†	111·0†	66·8†
Sulphur	—	21·7†	86·6†	—	18·3†	88·4†
Pyrites	—	18·3†	71·0†	—	14·3†	84·0†
Spent oxide	—	15·4†	166·7†	—	14·0†	149·7†
Molasses	11·3	24·9•	198·4	8·7	27·5•	118.5
Industrial alchohol (mil. bulk gal)	1.65	2·28	6·46	1·77	2·25	4·34
Superphosphate	92·7	77·1	54·4	87·9	94·8	100·8
Compound fertilisers	100·1	80·0	51·4	118·5	158·8	43·1
Agricultural lime	—	450·8	—	—	203·5	—
Ammonia‡	—	6·36†	5·24	—	5·26†	4·29
Phosphate rock (agricult.)	—	72·0	158·0	—	65·8	130·9
Phosphate rock (indus.)	—	7·67	36·2	—	4·15	38·2
Virgin aluminium	2·51	12·1	—	2·54	13·1	—
Magnesium	0·18	0·19	—	0·26	0·50	—
Virgin copper	—	28·9	90·1	—	32·9	90·8
Virgin zinc	—	17·9	47·6	—	19·6	33·2
Refined lead	—	15·9	31·3	—	15·3	12·8
Tin	—	2·15	13·2	—	2·70	15·0
Zinc concentrates	—	14·9	63·0	—	14·2	75·0
Steel ingots and castings (incl. alloys)‡	297†	—	—	254	—	—
Rubber						
Waste collected	—	0·02	11·1	0·07	1·87	74·1
Reclaimed	0·54	0·49	3·89	0·46	0·46	4·95
Natural	—	4·22	137·9	—	8·05	132·8
Synthetic	—	0·05	2·02	—	0·06	3·04

• *Distilling only* † *June* ‡ *Weekly average*

TOWN PLAN ABANDONED

OWING to the possibility of subsidence being caused by salt deposits, Mr. Lewis Silkin, Minister of Town and Country Planning, has abandoned his intention to establish a new satellite town for Manchester at Mobberley, Cheshire.

Several weeks ago, Geological Survey engineers stated that three borings had revealed substantial salt beds at depths from 600-700 ft. (THE CHEMICAL AGE, July 3). In one instance, the lower extremity of the deposit had not been reached at 675 ft. and was believed to go far deeper.

It is reported that in his search for alternative areas, Mr. Silkin has been impressed with the possibility of development at Congleton, Cheshire. Another possible site is in the Crowton area. Almost the whole of this region may contain useful minerals.

STEEL WORKS AT CREWE

A CONSIDERABLE addition to overall steel production and to Crewe's industries is foreshadowed by the very large steel-producing installation to be set up on a 73-acre site in Weston Lane. The work of excavating is now being carried out for the British Toolmakers' Corporation, which has works in Wolverhampton, West Bromwich and other Midland towns. The work of levelling the site and laying foundations for the erection of a machine shop and foundry was started four months ago. Several months more will be required to complete the site in readiness for the erection of the works. It was stated authoritatively last week that, partly because of the difficulty in obtaining constructional materials, the plant could not be ready for production in less than two years.

SULPHURIC ACID PRODUCTION

A Small Reduction in April—June

NO very pronounced changes in the production of sulphuric acid and oleum and the amount taken up by industry in the three months ended June 30, 1948, are revealed in the classified summary which the National Sulphuric Acid Association has just issued. The total amount of acid produced during the quarter, 398,744 tons, compares with 403,995 tons in the January-March period, and the reduction is shown to have been confined to chamber-produced acid.

The reduction in the quantity used in the acid producing plants is insignificant and the quantity delivered to industry at large, 277,552 tons, is slightly less than 1000 tons below the figure recorded in the previous quarter. Rather less acid is shown to have been used in fertiliser production and for rayon and transparent paper and there was an increase of approximately 4 per cent in the amount used for dyestuffs and intermediates.

The association's survey supplies the following classified information:—

SULPHURIC ACID AND OLEUM
Tons of 100% H_2SO_4

	Chamber only	Contact only	Chamber and Contact
Stock April 1, 1948	33,415	28,863	62,278
Production ...	192,971	205,773	398,744
Receipts	41,994	30,355	72,349
Oleum feed ...	—	3,679	3,679
Adjustments ...	−128	−54	−182
Use	123,057	76,677	199,734
Despatches ...	112,744	164,808	277,552
Stock June 30, 1948	32,451	27,131	59,582
Total capacity represented ...	220,120	216,510	436,630
Percentage production	87.7%	95.0%	91.3%

RAW MATERIALS
Tons

	Pyrites*	Spent Oxide	Sulphur and H_2S	Zinc Concentrates
Stock April 1, 1948	69,115	166,494	76,090	23,344
Receipts	89,814	54,088	69,679	42,085
Adjustments ...	−95	−392	−411	—
Use	87,170	48,380	64,552	40,549
Despatches ...	92	4,399	50	10
	21†	265†	16†	—
Stock June 30, 1948	71,551	167,146	80,740	24,870

* "Receipts" and "Use" include Anhydrite "converted" to Pyrites.
† Used at works for purposes other than Sulphuric Acid Manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM
(United Kingdom and Eire)
April 1st, 1948 to June 30th, 1948

TRADES	Tons 100% H_2SO_4
Accumulators	2,253
Agricultural purposes	942
Bichromate and chromic acid	2,574
Borax and boracic acid ("Unclassified")	
Bromine	3,441
Chlorsulphonic acid ("Unclassified") ...	
Clays (Fuller's earth etc.)	2,056
Copper pickling	756
Dealers	4,806
Drugs and fine chemicals...	2,595
Dyestuffs and intermediates	20,137
Explosives	3,081
Export	916
Formic acid ("Unclassified")	
Glue, gelatine and size	205
Hydrochloric acid	15,716
Hydrofluoric acid	1,848
Iron pickling (incl. tin plate)	21,727
Leather	1,826
Metal extraction	410
Oil (mineral) refining	10,547
Oil (vegetable) refining	1,827
Oxalic, tartaric and citric acid	1,977
Paint and lithopone	18,048
Paper, etc.	919
Phosphates (industrial)	1,145
Plastics, not otherwise classified ...	3,197
Rare earths	575
Rayon and transparent paper	36,162
Sewage	2,805
Soap and glycerine	1,137
Sugar refining	167
Sulphate of alumina ("Unclassified") ...	
Sulphate of ammonia	61,964
Sulphate of barium	1,255
Sulphate of copper	4,065
Sulphate of magnesium	2,054
Sulphate of zinc	672
Superphosphates	132,841
Tar and benzol	4,404
Textiles	5,903
Unclassified—Uses known	19,566
Uses unknown	10,720
Total	406,879

SCOTTISH DIATOMITE

SOME further details have been given of the plans for the development of diatomite deposits in the island of Skye by Scottish Diatomite, Ltd., a company newly formed for this purpose. An output of 2000 tons is expected in the first full working year, to be raised to about 5000 tons a year when the project is in full operation. The deposits were worked in the period before the first world war but have been lying fallow since.

It is estimated that there are at least 250,000 tons in the site at Loch Cuithir, 12 miles from Portree. A three-mile road to the deposits is now being constructed and some production is expected this year. Among the principal uses of the mineral are insulation and filtration. The Skye product is said to be of very high quality and compares favourable with raw materials now being imported from the U.S.A. Imported diatomite is currently being sold at rates ranging from £15 to £50 per ton, according to quality, and those values would offer prospects of successful development of a Scottish industry.

Defeating the Power Cuts

Advantages of Diesel Generators

MINISTRY of Labour plans for spreading the electricity load next winter (THE CHEMICAL AGE, July 17), provide for a peak demand reduction of 20 per cent by industry in the months of December, January and February.

This load-spreading cannot in itself, however, offset a generating plant deficiency which it is estimated, will reach 824 megawatts during the winter of 1951-52 despite the erection of new power stations in the intervening period. It is, therefore, difficult to see how the demand for increased production in industry, with a consequent rise in electric power demand, can even be attempted without further recourse to the "staggered hours" system introduced last winter.

Continuous Supply

These are topics of some urgency to which attention has been directed by Davey, Paxman & Co., Ltd., the diesel engine specialists, of Colchester. The company observes that many industrial concerns are now installing diesel-driven generating sets for the supply of electric power to their plants, thus ensuring continuity of production and avoiding the imposition of "irregular" hours upon their employees.

A diesel generating set, comprising diesel engine and alternator, occupying only 75 sq. ft. of floor space, will give an output of approximately 250 kW although it must be appreciated that this space covers only the driving and driven machine and not ancillary equipment such as fuel and cooling tanks. The engine possesses the additional advantage of running on an easily stored and non-inflammable heavy fuel oil, and although the question of the supply of this type of oil has been the subject of conjecture during the past few months, an assurance was given that there will be no shortage for diesel engines installed for the purpose of alleviating the power shortage.

Installation of the plant does not present much difficulty as many of the power units now supplied are self-contained and the engine and electrical equipment are mounted on a fabricated steel underbed, equipped with foundation bolts which need only be grouted down into concrete flooring.

Although it is only possible to give a general estimate of running costs, says Davey & Paxman, reports from various users assess these at ¾d. to 1¼d. per unit for plants ranging from 50 to 260 kW capacity. An accountancy depreciation period of 15 years is considered usual in the case of a well maintained engine of modern design.

The European Fuel Problem

Reluctant Use of Low-Grade Coal

From Our Italian Correspondent

ONE of the most pronounced examples of the widespread European problem of reducing the dependence upon imported fuel supplies by greater use of low-grade indigenous coal is at present receiving anxious attention in Italy. The country has relatively large quantities of home-produced coal, which many industries are reluctant to use. In June some 81,000 tons of Sulcis coal were produced and there was already a reserve of 140,000 tons.

Meanwhile, supplies of imported coal, chiefly American, are again on a large scale, and there is a prospect that obligatory purchases of Italian lignite and price cuts will be resorted to to enable it to compete with the imported supplies.

Preoccupied with the unwillingness of Italian consumers to use brown coal, numerous technicians in the country are suggesting its use by the Portland cement industry, which is supposed to be able to work satisfactorily with very low-grade fuels.

In reality this is not a fact. Before the war, Portland cement factories did use the local coal but it was chiefly the variety found in the mines of Arsa in Istria. This coal does not possess a great heating power (6500 calories) but it was convenient enough owing to its low ash content.

High Ash Content

Istria is now lost to Italy and thus the cement industry has at its disposal only Sulcis coal and some lignites. The ash content of Sulcis coal is in the neighbourhood of 20 per cent, composed principally of iron oxide, sulphur and lime. It has about four times the ash content of foreign coal. During the heat treatment of cement, at least a part of the ash is mixed with the clinker and when the ash content of coal is high the quality of cement suffers.

The cement factory at Spoleto, which uses lignites, secures a special variety not often available, and subjects it to preliminary treatment. It has also to use 20 per cent of imported coal.

Much has been written about the factory at Sinigallia which was said to use entirely the home variety of coal. The fact is, however, that in spite of all their efforts and complex corrective processes, the technicians of this factory never succeeded in dispensing with imported coal altogether. On the other hand, the corrective processes led to prohibitive manufacturing costs, while the quality of cement produced barely reached the admissible minimum.

Untapped Oil Reserves

Exploiting Colorado's Vast Shale Beds

PRIVATE oil companies are co-operating with the U.S. Government in exploratory drilling and assay work connected with the development of western Colorado's immense oil-shale beds, estimated to contain 300 billion barrels of shale oil, which, if recoverable, would represent the equivalent of 150 years' supply of liquid fuel, based upon the 1947 rate of consumption.

Extensive Drilling

At least 11 diamond core drill holes are to be sunk this summer in the Green River formation, which is said to be the world's largest single mineral deposit. At least four drillings are planned by the Union Oil Company of California, and seven by the U.S. Bureau of Mines, acting for the Department of the Navy. In addition, the Pacific Oil Company, a subsidiary of the Standard Oil Company of California, is carrying on geological and assay work to assess the value of its properties in adjacent areas.

Probing 1500 ft.

All Government-sponsored drilling will be done under contract on Naval Oil Shale Reserve No. 1, where the Bureau of Mines is now operating a shale-oil demonstration plant and an experimental mine under its synthetic liquid fuels research and development programme. Each of the seven holes tentatively planned by the Bureau of Mines will be drilled to a depth of 1500 ft., and these shafts, together with four others put down in 1945 and 1946 preparatory to the opening of the Bureau's mines, are expected to give the Navy more information on the extent of the deposits.

Drilling operations carried out by private oil companies will be conducted on their own sites. The firms plan to set up their own testing facilities and the Bureau has promised its assistance in training laboratory staffs and in periodically checking their analyses.

Wider Use of Lignite

Objectives of New U.S. Laboratory

SUBSTANTIAL advances in the technology of lignite, as a fuel and as a chemical raw material, are expected to result from the large-scale research laboratory for the U.S. Bureau of Mines, construction of which, at Grand Forks, North Dakota, is about to begin.

Representing the culmination of many years of co-operative research in lignite between the Bureau of Mines and the University of North Dakota, the new centre, in the heart of the American lignite country, will include a laboratory for small-scale research, a general service section for supplies, and a machinery bay suitable for large-scale pilot plant research.

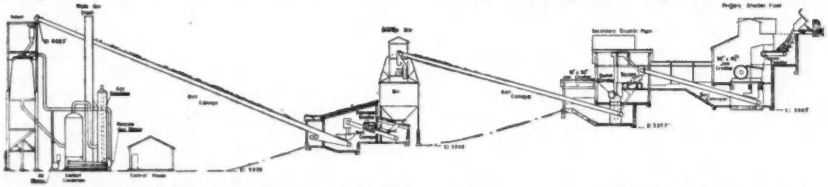
One-fifth of All Reserves

Because lignite is a high-moisture coal which tends to crumble upon exposure to air, its present use is restricted primarily to the mining areas. To help expand the geographic distribution of a fuel which represents nearly one-fifth of the American coal reserves, the new research centre will concentrate upon improved methods of drying lignite. Development of effective drying methods should permit the transportation of lignite to more distant areas and will reduce the demand for higher-grade fuels. Bureau research will also be directed toward developing equipment for burning lignitic fuels and more efficient coal-gasification methods.

Chemical By-Products

Other phases of the research programme will include study of gasifying lignite to provide high-hydrogen gas and the development of new scientific, chemical and technical uses for lignite and its products.

American lignite reserves are estimated to represent approximately 939 million tons.



All the processes for the recovery of shale oil are represented in this flow sheet of the demonstration plant at Rifle, Colorado, where the U.S. Govt. and industry will collaborate. Shown (from right to left) are the primary and secondary crushers, (centre) the storage bins and conveyors, (left) the retort, contact condenser and gas scrubber

Copenhagen Exhibition

Sparse Chemical Publicity

COMPARATIVELY little individual effort to provide advance information here appears to have been undertaken, as yet, by the British chemical firms whose products will be on display at the 1948 British Exhibition opening in Copenhagen next month.

As far as the general organisation of this "Scandinavian shop window" is concerned, however, arrangements are well in hand and the demand for stand space has been so great that many applications have been refused.

The display (September 18-October 3) will be housed in Copenhagen's principal exhibition buildings, the Forum and the Tivoli Gardens and other premises which will be utilised include the Royal Riding House, the Gutenberghus and two floors of the Magasin du Nord, Denmark's largest department store. Several temporary buildings are also being erected.

Chemical Equipment

In addition to those members of the ABCM already announced (THE CHEMICAL AGE, June 5), exhibitors from industries closely connected with the chemical trade include the following.

Dexine Rubber & Ebonite, Ltd., Rochdale (moulded ebonite centrifugal chemical pumps, steam valve discs and moulded rubber lids for food storage equipment).

George Kent, Ltd., Luton (flow meters and instruments for measurement and control, including an air-operated apparatus for the automatic control of temperature, flow, *p*H pressure, etc., which is being shown for the first time outside Britain.

N. C. Joseph, Ltd., Stratford-on-Avon (aluminium drums for chemicals, and edible oils, etc., up to 300 litres capacity. This is the first occasion upon which bulk containers in aluminium have been exhibited on the Continent).

Stanton Ironworks, Nottingham (a range of spun iron pipes, including the new 650 mm. size which is the largest type of pipe spun in metal moulds in Britain and displayed for the first time in any overseas exhibition).

Bakelite, Ltd., London (new type of decorative laminated plastic sheet material which, though possessing rigidity can be formed to suit various purposes and at the same time passes the British Standards test for non-inflammability).

Rheostatic Company, Ltd., Slough (automatic temperature control devices, including a new mixing valve which permits domestic

(*Continued at foot of next column*)

water temperature and boiler temperature to be maintained at constant high value while heating the flow water.

Advance details of the I.C.I.'s stand indicate that the firm's main object is to convey a brief impression of the company's world-wide scope and resources.

Exhibits will be arranged to illustrate the importance of coal in the organic chemical industry and after outlining the company's organisation, will publicise some of its 12,000 different products, which range from heavy chemicals, fertilisers, explosives, dyestuffs, paints and non-ferrous metals to medicinal drugs, zipp fasteners, sporting ammunition and leathercloth.

In the mornings, the exhibition will be open only to trade buyers and official visitors. The public will be admitted after lunch and on Sundays.

AEC Aids U.K. Research

First Export of Equipment

TWO high-voltage X-ray generators, to be used in research, will be sent to the United Kingdom under export licence from the U.S. Atomic Energy Commission, the commission has announced. The licences are the first granted by the commission for export of such equipment since it issued a regulation last November for control of facilities that can produce fissionable materials.

"Although some types of particle accelerators can produce microscopic amounts of fissionable materials," the commission said, "such machines are primarily research tools." It added that the type being sent to the United Kingdom was used mostly in medical and biological research.

The National Physical Laboratory, Teddington, will get one of the generators and the Sheffield National Centre for Radiotherapy, Sheffield, the other. The Teddington laboratory plans to use the machine for X-ray standardisation of dosage and protective levels. The generator going to Sheffield will be used in research on radiotherapeutic techniques and cancer studies.

Peat Fertiliser

Encouraging results are reported in Scotland from the use of a compost based on peat and incorporating all the vital plant food elements. One instance, confirmed by the Shawfield Park, in Glasgow, reports exceptionally fast and excellent results where the compost was used to returf sections of the field which had worn bare. Cost is likely to be the only limiting factor, since incorporation of all the essential elements in the compost makes it fairly highly priced.

POLYTHENE FOR CHEMICAL PROCESSES

Many Uses of a Versatile Material

From a Special Correspondent

AT normal temperatures polythene is practically immune to the action of most corrosive chemicals and solvents. In addition to general inertness to attack, this thermoplastic material can be shaped, welded or moulded to make pieces of chemical plant and sheets of polythene may also be used for the lining of vats made of wood or metal. Other important advantages enjoyed by polythene include a low density (0.92 at 20°C.), flexibility and a high degree of toughness.

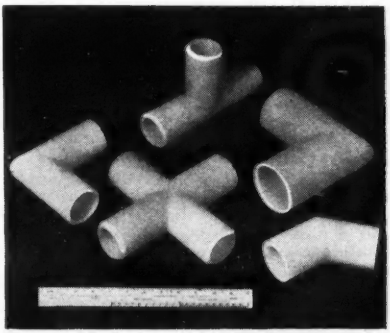
Polythene is available in several different grades depending on the molecular weight and therefore the fluidity or viscosity of the molten products. The shorter molecular chain compounds are mobile oils which find special uses in industry while the products whose molecules have a mean length of about 600 ethylene units are translucent, tough, flexible wax-like solids, the tougher grades of polythene, *i.e.*, those lying in the molecular weight range of 13 thousand to 25 thousand, are of most interest to the chemical engineer as they possess superior mechanical properties and greater resistance to solvents and chemicals and water than the lower molecular weight grades.

This plastic possesses a very high resistance to moisture penetration. Good polythene mouldings show no gain in weight after seven days' immersion in water at all temperatures up to 100°C. Water absorption becomes detectable only if moulding is carried out at too low a temperature and under these unfavourable conditions the polythene article is likely to shown a gain in weight of 0.025 per cent after seven days' immersion in water.

Immersion Factors

At normal temperatures (20°C.) the solid grades of polythene are insoluble in all solvents, although some absorption occurs. When the temperature is raised to about 60-70°C. polythene becomes readily soluble in certain solvents, including benzene, xylene, toluene, trichlorethylene, carbon tetrachloride, chlorbenzene, petroleum ether (b.p. 80-120°C.), tetrahydronaphthalene, "medicinal paraffin" and mineral lubricating oils.

At temperatures below 65°C. polythene is practically unaffected by chemicals. When immersed for 24 hours at 100°C. in dilute nitric and concentrated hydrochloric acids, and in 50 per cent caustic soda, thin strips of polythene showed no change. Under similar conditions concentrated sulphuric acid produced some charring. Organic low molecular weight polar liquids, *e.g.*, alcohols, esters and ketones, are poor solvents but they may cause polythene to fracture under strain if in contact with the liquid or vapour. A sample immersed in the liquid or in contact with the vapour regains its flexibility when allowed to dry.



These are some of the variety of joints which are now being fabricated in polythene

Several different forms of this plastic are available for use in chemical vessels and plant. The most readily adaptable is the granular form which is suitable for all flow-casting, moulding and extrusion methods. Among the many other forms in which the thermoplastic is now being met with are sheets, tubes, rods and film, and as a powder suitable for flame spraying. The sheets are chiefly of interest as lining for many forms of large chemical vessels.

The mechanical strength of polythene varies with different grades, the toughest grade giving the best results, although this is not so adaptable for some equipment-making applications. Generally, the tensile strength of a tough grade of polythene is from 1800-3000 lb. per sq. in. and the extension at break 150-600 per cent.

The thermal expansion of polythene amounts to 0.00020 cm./cm. 1°C. in the range 0-40°C. The thermal conductivity is 0.0007 cals. per sec. per cm. per cm.^{2} per 1°C., equivalent to 340°C. per watt per cm. per cm. Below the melting point (115°C.)

polythene is remarkably free from cold flow. This is important as it ensures that when chemical plant is in use there is no fear of alteration of shape, provided the temperature is maintained at a figure well below the softening point.

The flexibility of polythene is lessened with decrease in temperature below 0°C., the lower molecular weight grades becoming brittle at −25 to −30°C., while some of the tougher grades remain flexible at −100°C.

Production of Polythene Chemical Plant

There are eight methods of using polythene for the total or partial production of chemical plant:—

1, Flow casting; 2, centrifugal flow casting; 3, sheet lining of metal and wood vessels; 4, extrusion of tubing; 5, extrusion moulding; 6, moulding (compression and injection methods); 7, welding; 8, flame spraying.

The first two processes take advantage of the properties of hot melts and are aptly suitable for the production of hollow articles and containers of large dimensions. A low melt-viscosity polythene is generally preferred for this type of work as it is easier to mould and shape than are the tougher grades.

The flow-casting method is fairly simple in principle and entails the use of sheet metal mould, made in sections which can be clipped together, and first treated with a lubricant. Polythene in granular form is placed in the mould which is heated to 160°C. to melt the polythene. The mould is then inverted so that the sides are coated with a uniform layer of polythene. After cooling with cold water, the mould sections are unclipped and the casting may be stripped from the mould.

Centrifugal flow-casting is merely an elaboration of this method. The calculated amount of polythene granules is placed in the well lubricated brass mould which is heated to 200°C. and then rotated until all the polythene has melted and flowed evenly over the surface. The mould is cooled while rotation is maintained and, after two hours, the moulded article is withdrawn.

Plant is lined with polythene sheet by the following method:—

1. The sheets are cut to fit and, if necessary, shaped or bent by first heating until softened and then bending over wood formers. The optimum temperature for manipulating the polythene for this use is 105°C.

2. Welding of the joints is carried out with a specially designed electrically or gas heated welding torch which makes use of a stream of nitrogen gas at 200°C. When this jet is directed on to the joint and a polythene filler-rod used to make the weld it is possible to effect perfect sealing.

3. Where parts of the equipment have to be machined there is no difficulty in working polythene block in ordinary wood cutting machines. It is advisable to direct a jet of air at the turning to prevent heat softening of the polythene and to remove swarf.

4. If tubes of large diameter have to be bent it is recommended that this should be carried out at about 105°C. The use of bending springs prevents the premature collapse of tubes and maintains a uniform bore.

By simple fabricating methods it is possible to build up large containers for corrosive acids, pipes in 3-4 ft. diameters, T-pieces and flanged pipes for chemical works.

The extrusion of tubing of diameters up to about 10 in. presents few practical difficulties provided the correct temperatures are maintained for the grades employed. The tougher grades of polythene require a barrel temperature of about 115°C. and a die temperature up to 160°C. Tubing leaving the extruding die is generally cooled by passing through a tube which is air cooled and allows for the extruded tube itself to be supported internally by means of a stream of air. There is an inevitable expansion of polythene as it leaves the die and to compensate for this it is necessary to adjust the speed of drawing so that the correct bore and wall thickness are obtained.

Extrusion Mouldings

Extrusion moulding is a comparatively new method which makes use of light and inexpensive moulds and yet enables mouldings up to 100 lb. or more in weight to be produced.

In this method of moulding—forcing the melted polythene into a metal mould by means of a screw type of extruder—when the mould, which should be provided with air vents (sealed at the time of filling), is filled it is progressively cooled from the points furthest from the nozzle. If the mould is exceptionally large, great care needs to be taken to prevent premature cooling and it is usually recommended that the mould be maintained at a temperature of 85-125°C., during the filling operation, and afterwards reduced slowly.

Moulding by either compression or injection methods will give good results, provided dequate allowance is made for high mould shrinkage due to the high coefficient of expansion. The heat applied during moulding has no harmful effect on the plastic and oxidation does not take place.

Flame spraying of polythene has been

used with some success and coatings have been applied to metal, wood and ceramic surfaces. The difficulty has always been to achieve a high degree of adhesion to the base and to build up satisfactory coatings on sharp edges and in recesses. The difference in thermal expansion between the coating and the base material also tends to mitigate against firm adhesion.

It has been found that the adhesion of polythene to metal is improved by first applying a layer of asbestos flock which may be made to adhere to the surface by means of special adhesives. This asbestos layer forms a very satisfactory key for the deposit of polythene and enables good thicknesses to be built up.

In flame spraying it is necessary to use a fine powder which is sprayed through a concentric flame of an ignited mixture of air and butane or boosted town gas. In practice, the cleaned and degreased metal article is first warmed and the applied polythene coat given a final " flaming " to ensure that the deposit of polythene has a fine, smooth surface.

Chemical Equipment

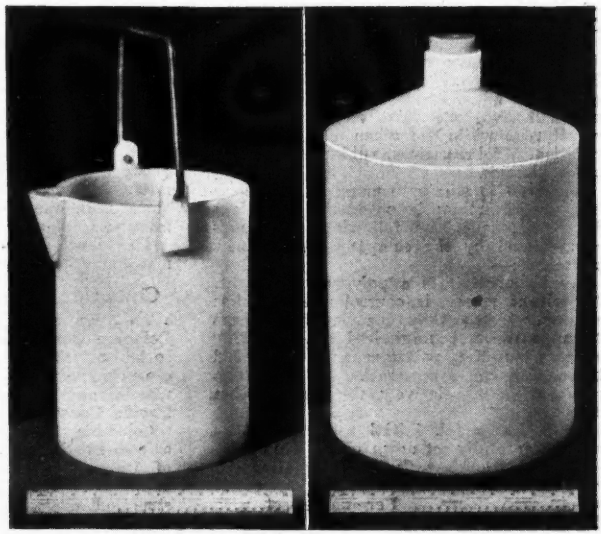
While standard fabricated forms of polythene find many uses in chemical works, the greatest use is found for the specially designed and made-to-measure pieces of equipment. These the chemical engineer requires for an increasing number of processes which involve the handling of corrosive liquids. Such things as metering wheels for pumping systems in acid works have been successfully moulded of polythene and so also have many other items of specialised equipment.

Small bore extruded tubing and tubing up to 60 in. diameter produced by centrifugal casting processes give good results for conveying acid liquors and other corrosive fluids, provided these are not above 65-70°C. Flanged pipes, T-pieces are also more or less standard pieces of equipment. Polythene-lined steel pipes are important for works where there is need for chemical resistant piping having rigidity and pressure strength.

No Contamination

Apart from the use of polythene tubing for conveying acids, alkalis and salt solutions, etc., it is also proving of value for handling fine chemicals and biological preparations which must be free of all traces of metallic impurities. In the production of penicillin, streptomycin and other highly sensitive therapeutic agents the use of polythene tubing has a special usefulness as it offers the inertness of glass without its fragility, weight or rigidity; moreover, whereas glass and metal tubing cannot readily be bent at acute angles without risk of breaking, the polythene tube is readily amenable to all forms of bending

Polythene carboy caps, gaskets and sealing rings are now fairly common. They are exceptionally tough and withstand pro-



For nearly every kind of corrosive liquid polythene is providing a highly adaptable material for the construction of containers, such as the stout bucket and well-designed carboy shown here

Illustrations by courtesy of Rockweld, Ltd., Croydon

longed exposure and rough treatment without deterioration.

Comparative Merits

Of the three important thermoplastics used for the construction of chemical plant polythene seems to possess the most advantages. This may be ascribed to the fact that it combines toughness with resiliency and is less liable to fracture than hard and brittle materials. Saran (polyvinylidene chloride) has a higher softening point than polythene, the hardest grade being able to withstand temperatures up to 350° C., but because of its lower resiliency chemical plant made from it is liable to shatter when subjected to pressure or sudden shock. This weakness is particularly important where extruded tubing is used for conveying corrosive liquids. Rigid PVC possesses a somewhat higher impact value than Saran and although less resilient than polythene, is better able to withstand pressure and, therefore, less liable to damage.

Bearing in mind the limitations imposed by the thermoplastic nature of polythene, there is reason to anticipate an increased demand once the chemical industry widely appreciates the comparative simplicity of converting it into pieces of equipment.

In the writer's opinion the most promising future for polythene in chemical plant lies in its use as a protective lining for metal. (So far the successful development of polythene-metal equipment has been fairly slow owing to the difficulty of securing good adhesion of the plastic to the metal). Emphasis is placed on the importance of manufacturing polythene-lined metal drums, tankers and storage vessels, which would supply a pressing need in chemical industry.

It is of interest to note that polythene film has been used to a small extent for the lining of wooden kegs to be used for the bulk packaging of dye intermediates and other solids of a highly corrosive nature. As the film can be heat-sealed there is no difficulty in ensuring good sealing of the lining.

Progress has been made in the development of polythene coated paper and fabric for packaging materials of a corrosive or hygroscopic nature. The polythene, which is applied to the paper or fabric as a hot melt by means of a doctor blade, keys perfectly to the material and provides a tough and corrosion-resistant surface. Once polythene is freely available, it is likely that extensive use will be made of coated paper sacks for the bulk packaging of a wide range of solid chemicals.

CLAIMS FOR NEW PLASTIC ADHESIVE

A NEW adhesive for bonding polystyrene either to other pieces of the same material or to certain other solids has been developed by the chemical division of the Koppers Company, Inc., Pittsburgh, Pennsylvnia. When bonds are made with the new adhesive, one joint element must be polystyrene while the other may be paper, cardboard, fabric, glass, rubber, or certain other plastics.

Designed to eliminate many of the shortcomings of previously obtainable adhesives for polystyrene, the following advantages are claimed by the company for the new adhesives :—

1. Although it is a polystyrene solvent, its solvent power is controllable so that etching, which weakens the plastic and mars its appearance, is minimised and moulding stresses in the polystyrene are relieved before they can cause cracks, the new adhesive having a relatively slow evaporation rate.

2. It has quick initial set. Assemblies may be carefully set down or removed from clamps in less than five minutes after the adhesive is applied. They can be packed within two hours. Permanent set with maximum bond strength develops within a few days.

3. When the adhesive is properly applied, clear, bubble-free bonds of great strength are obtained.

4. In dry assembly it can be applied with a small brush, a hypodermic syringe, or an eye dropper, since it flows readily.

5. It can be used for filling the gap between poorly matched joint surfaces by mixing two parts of the adhesive with not more than one part of polystyrene. The mixture is then used as a cement.

The new adhesive was developed after many months of research.

Canadian Chemicals and Plastics

The British Columbia project of the Celanese Corporation of America is stated to be only the initial phase of what Celanese principals visualise as a fully integrated plastics and chemical industry on Canada's Pacific Coast.

Columbia Cellulose Co., Ltd., a wholly-owned subsidiary of Celanese Corporation of America, is expected to start production of pulp towards the end of 1950. Construction of a mill is now in progress.

METALS AND CERAMICS

Wide Industrial Possibilities of Coatings

THE combined use of metals and ceramics under conditions in which considerable stresses and thermal shock are to be anticipated was recently the subject of an unusually informative symposium provided by numbers of specialists in the U.S.A. The meetings, lasting two days, were convened by the headquarters of the U.S. Air Materiel Command and, while the data was immediately concerned with aerial jet-propulsion units, it threw useful light on many procedures designed to overcome the obstacles presented in high temperature work by the relative instability of most metals.

Brigadier-General Brentenaugh, Deputy Director of Research, welcoming the group, recalled the fact that only ceramic materials were able to withstand the high temperatures, 2000-5000° F., developed in aircraft engines.

The Air Materiel Command was interested in immediate applications, and had employed under contract the facilities of institutions which could operate in familiar areas, and with whom commercial firms could co-operate in further developments of the materials developed experimentally.

Colonel R. J. Minty, of the Power Plant Laboratory, stated that in reciprocating engines temperatures up to 3000° were encountered, and turbo-chargers operated continuously at even higher temperatures. Materials of construction to operate successfully under these conditions had been sought since 1940 when certain satisfactory alloys were produced. It was found, however, that the ultimate temperature which metals could withstand was about 1800° F., and for the higher temperatures ceramic materials were necessary.

Heat Resistance

The first formal paper was presented by Major R. A. Jones, of the Power Plant Laboratory, on "The Requirements for Ceramic Materials for Application to Aircraft Power Plants." He noted that power plants had to be smaller and operate on less fuel. Ceramic materials had been found to withstand satisfactorily higher temperatures than metals, and had sufficient strength. They were used for protection or replacement. Ceramic materials had the additional advantage of being non-strategic and in good supply.

Major Jones defined as a ceramic any non-metallic, non-heat-conducting substance. Among the physical and mechanical properties necessary for ceramic coatings for metals, Major Jones mentioned unfired and fired, brushed or sprayed coatings, metal-bonded ceramics, and tin surface treatments. These materials had to be heat-and-shock resistant and prevent oxidation of the metal to which they might be applied. Such coatings increased the life expectancy and stability of the metal in service.

By virtue of their insulating and radiation-suppressive properties they could operate above the maximum temperatures ordinarily withstood by metals. Coatings of the thin type had advantages of adherence, thermal shock resistance, and the ability to withstand centrifugal force. These coatings have been found to have special emissive characteristics.

Choice of Materials

For turbine blade construction much research on composition and mechanical behaviour, especially mechanical shock resistance, was required. For this purpose the metal-bonded oxides, nitrides, and carbides were promising. For jet engines and ram-jets, insulative bodies of greater thickness were required, and these were sometimes used as preformed segments for liners. In jet engines, enamels were satisfactory from 1300° to 1600°, but the temperature at which these engines operated could be raised to 2500° if protective materials could be found.

Rocket engines operated at temperatures up to 5500° F. and required coatings with a softening point above 3500°. The temperature at which these engines could be operated was limited only by the refractoriness available.

A paper on metal-protective ceramic coatings was presented by Mr. W. J. Plankenhorn, University of Illinois, who reviewed the formulation of base and top coats in an endeavour to attain better insulating value and maximum protection of the underlying metal.

Fundamental factors such as the effect of coatings on the strength of metals at high temperatures had been investigated. Oxidation rates had been measured by weight increase. Tensile tests at high temperatures showed that the coated metal had greater strength than the uncoated. The materials developed in this investigation worked satisfactorily up to 1800° F.

Reviewing the work of the Ohio State University group on metal-bonded coatings ("cermets"), Mr. E. T. Montgomery said these materials became plastic only when they reached temperatures of the order of 2000° above the melting point of the metal.

In some cases the metal melted away, leaving the coating intact—a significant point in relation to rocket design.

The first "cermet" was made from cobalt and silicon carbide. Combinations of iron and magnesia, nickel and magnesia, cobalt and magnesia, iron and alumina, and aluminium and alumina, had been developed. The metal oxides appear to go into solid solution.

One of the best cermets consisted of 75 per cent nickel and 25 per cent magnesia. Some coatings were applied cold, using 25 per cent sodium silicate as a vehicle; in other cases flame spraying was used. Satisfactory results had been obtained from torching and furnace sintering of coatings applied cold. The metal coated on both sides with the Ni-MgO cermet at a thickness of 5 mm. had withstood 2800° F. for some time and 3500° for as long as 2 minutes. In one test 1020 steel so protected withstood 5000° F. for 15 seconds.

Development of enamel-type coatings and metal-bonded ceramic coatings was briefly reviewed by Mr. R. M. King, of Ohio State University, who said that enamels had been applied to inconel at 2300-2350° F. Quartz, flint, and feldspar have been used as mill additions. Efforts had been made to develop tests of such coatings, particularly with regard to thermal shock resistance.

A paper on "Cermet Solid Bodies," by Mr. T. S. Shevlin, Ohio State University, dealt with the theory of wetting and bonding. Ceramic bodies alone were not sufficient to withstand service conditions in jet-propelled engines, but the addition of metal powder increased the necessary resistance to thermal shock.

Work was begun by the introduction of chromium and aluminium into alumina bodies. A pink colour observed, was due principally to particle size, and only indirectly to chemical reactions. Solid solutions formed enhanced the refractoriness of the body. It was found that there was no inherent tendency for the metal to wet Al_2O_3 below 3000° F.; but wetting involved the formation of oxides at high temperature. High metal vapour pressure was likely to lead to poor strength.

In the discussion following these papers, Mr. R. E. Stark, Stupakoff Ceramic and Mfg. Co., brought up the question of toxicity of beryllium oxide, which, however, was not as high as that of beryllium metal and beryllium fluoride which sometimes gave rise to disease, and had been known to prove fatal. The point was made that although beryllium oxide itself was not very toxic, in operations involving its use, as in the preparation of metal-bonded bodies, extreme precautions were necessary.

MORE GERMAN REPARATIONS

SEVEN more German industrial plants, available as reparations and about to be allocated between the member nations of the Inter-Allied Reparation Agency, are listed in the current issue (August 7) of the *Board of Trade Journal*.

Among them are two chemical plants, Chemische Fabrik, V. Transche & Co., K. G. Gertshofen, producing hydrazine hydrate; Kalle & Co., Wiesbaden-Biebrich, part plant for the production of methyl, ethyl, and cellulose type products; two metallurgical plants, Heinrich Diehl, G.m.b.H., Nurnberg, producing aluminium and copper fabrications, and Degussa, Rheinfelden, part plant for the manufacture of beryllium.

The remaining three, comprising engineering and machine tool equipment, are O. and K. Giessler, Munchen, Huttenverein, A.G., Dortmund-Hoerde, N.-Rhein, Westf., and Heinrich Wagner.

Those wishing to acquire any of this material should communicate, before the end of August, with the production departments of the Board of Trade or the Ministry of Supply.

GERMAN PLANTS ACTIVE

THE Argentine Government has recently published a *communiqué* about the fate of the 30 odd former German concerns which have been put under special State administration by the establishment of the Direccion Nacional de Industrias del Estado.

Regarding former German chemical enterprises, it is stated that the Institut Behring-Beyer, the leading unit of its kind in Argentina, has increased its output by 20 per cent since the end of the war. It manufactures among others veterinary sera of importance to the cattle breeding districts. Among iron and steel producers, the former German enterprise "Crefin," has since the war erected a new rolling mill and a Siemens Martin furnace. Monthly output of rolled products totals 1500 to 2000 tons, that of foundry products 400 tons and steel production is said to total 2000 to 2500 tons. Only Argentine raw materials are being used by this concern. The machine construction plant of the Thyssen Lametal Company has been converted to serve the needs of the State Oilfields Administration.

STILL MORE SILICONES

Widening Applications in Many Industries

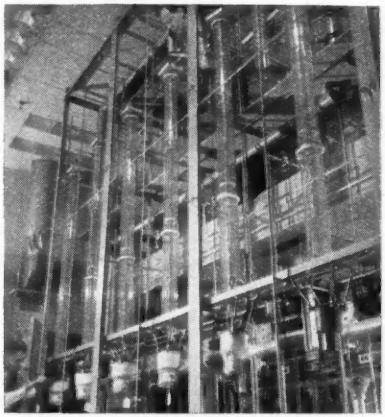
THE rapidly increasing importance of silicones as a branch of chemical industry and their application to many other industries is reflected by the recent completion at Waterford, New York, of what is probably the largest manufacturing plant for silicone products. It is being operated by the chemical department of the (U.S.) General Electric Company which, having operated on a smaller scale for nearly a year, is now undertaking full production, in the light of its recent experience of production and industrial needs.

According to the head of this department, the demand for silicone materials, principally in the forms of rubber, oils, greases, resins and water repellants, has come from nearly all branches of industry interested in heat-resistant materials. He considered that applications for the materials in all forms would become increasingly widespread.

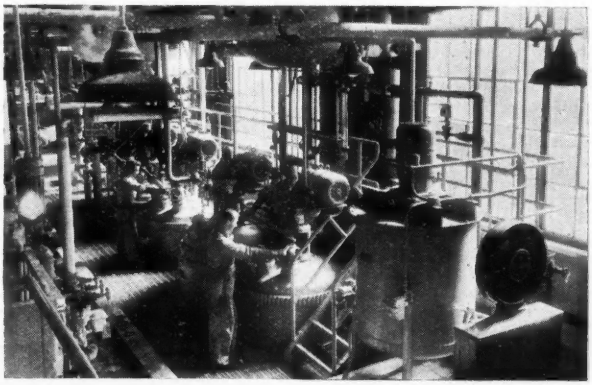
Temperature Resisting Gaskets

Derived from sand and processed by a completely new form of chemistry, silicone materials can withstand a wide range of temperatures from approximately 70° F. below zero to 520° above. The materials are now being applied in as widely diversified products as diesel engines and fishermen's dry flies.

The major output of General Electric's silicones to-day is in the form of rubber, oils, and "bouncing putty," which has been successfully used as the centre of golf balls. The silicone rubber is being applied primarily as gaskets for a host of industrial products such as capacitors, jet and gas turbine engines, baking ovens, lighting fixtures, and high vacuum systems. One of the principal uses for the oils is as a mould lubricant in the manufacture of automobile tyres and in aluminium and zinc die-casting.



A new material which reduces water absorption in concrete and cement products and forms an invisible water-repellant coating on walls, floors, and similar surfaces, is now being investigated by the company's chemical department. A derivative of silicone materials, the water-repellant is a new grade of the company's Dri-Film which has been successfully used for treating ceramics, paper, plastics, and other materials. It can be applied by spraying or brushing.



Series of reaction kettles in the new (U.S.) G.E.C. silicone plant and (above) some of the twelve distillation columns used for small-scale laboratory work

SCOTTISH INDUSTRY REVIEWED

White Paper Reflects General Expansion in 1947

THE development of many new chemical substances, says the annual review of Industry and Employment in Scotland, 1947 (HMSO, 1s. 6d.), continued during the year, to a large extent as the result of putting wartime knowledge to useful peacetime purposes. Particular reference is made to the I.C.I. product—"Ardil." This fibre has proved so successful that plans have been made for its production in another I.C.I. factory in the south-west of Scotland. It is expected that this new venture will use a by-product of the African groundnut scheme. Utilisation for the paint industry of a material used in wartime as the basis of a powerful explosive and manufacture of fertilisers from wartime smoke-screen material are among other developments which have taken place in Government factories in Scotland.

THE vigour with which Scottish industry and administration are putting into effect the policy of developing output of manufactured and natural products is reflected in the recently issued review of industry and development, summarised here, and by the appointment last week of a Mineral Resources Panel of the Scottish Council under the chairmanship of Mr. J. C. George, served by the following: Major the Hon. Robert Bruce; Mr. A. S. Butler, Department of Health for Scotland; Prof. W. M. Cumming, Royal Technical College, Glasgow; Mr. W. D. D. Fenton, North of Scotland Hydro-Electric Board; Prof. G. Hibberd, Royal Technical College, Glasgow; Dr. MacGregor, and Dr. T. H. Whitehead, Scottish Office, Geological Survey, and Mr. W. R. Flett (secretary).

Proposals by British Petroleum Chemicals, Ltd. (formed jointly by the Anglo-Iranian Oil Co., Ltd., and the Distillers Co., Ltd.), to erect an extensive factory at Grangemouth for the processing of chemicals from petroleum, asserts the review, will augment an already well-established industry in that area. The consumers of these chemical derivatives will include the plastics and rayon, drugs, pharmaceuticals, dyestuffs and textile printing industries.

Cooper, McDougall & Robertson, Ltd., Glasgow, has undertaken great extension schemes for its works. They will be carried out in stages over the next few years at an estimated cost of £1 million. The labour force has been increased by 30, while the total scheme will require a further 300-400 workers. It is further noted that 90 per cent of the firm's output is for export, principally to hard currency countries. Five new projects approved in the chemical industry during 1947 should give employment to about 500 persons when in full production.

Alginate Products

The Scottish Seaweed Research Association continued its activities during the year. Commercial developments in this industry are carried out by Alginate Industries, Ltd., which already has factories at Girvan, Barcaldine, Kames Bay and Lochboisdale. Intensive research and experiments in the potential industrial uses of seaweed have revealed diverse and increasing possibilities. From alginic acid and its salts are derived products of proved value in the manufacture of food, transparent films, paints, electrodes, textiles, plastics, and cosmetics. One of the newest products is a soluble alginic swab for medical purposes.

The rearrangement of the three factories producing maize starch in the Paisley area (mentioned in last year's review) had not yet been possible, but a slight increase in output had been achieved by means of an alteration in the methods of production without involving the employment of any extra labour.

Oils and Fats

Despite the great decrease in imports of oilseeds into the U.K. compared with the pre-war years, the Scottish mills are processing roughly the same tonnage. The industry is far from working to capacity and only five of the eight Scottish mills are in operation. An additional margarine factory was reopened in Aberdeen during 1947, making a total of six margarine factories and eight compound factories. The animal fat melting trade is still "concentrated," and production is restricted because of raw material shortages.

The British Aluminium Co.'s reduction plants at Foyers and Lochaber in Inverness-shire, and Kinlochleven in Argyllshire, produced 18 per cent of the year's consumption of virgin aluminium and 10 per cent of the

total consumption, including secondary and scrap metal. From 1600 to 1700 persons were employed at the reduction and hydro-electric works, but this number will probably fall to 1500 during 1948 because of the reduced load arising from the reconstruction and re-equipment programme, which was started in 1947. This will probably be completed about the end of 1948 and is expected to increase output by 17 per cent. Similar economies in employment are being made at Burntisland factory producing alumina from imported bauxite.

The Scottish rubber industry, like its counterpart in England, is operating at a rate considerably above any previous peace-time level.

During the past year plans for greatly increased tyre production did not wholly materialise. Owing to the fuel crisis many subsidiary raw materials such as fabrics, beadwire and chemicals became scarce. Channel grade carbon black was also in short supply. These shortages, however, were in the main, overcome during the year. Another large tyre-producing concern in Scotland, The India Tyre & Rubber Co., Inchinnan, has very big schemes in hand for extensions to be carried out over the next two years at an estimated cost of £100,000. Part of the scheme is proceeding, and it is estimated that employment for an additional 750-800 will eventually be available. The proportion of persons known to have been engaged on export work in the rubber industry at the end of the year was 35 per cent.

Shale Oil

The industry, which is centred in the Lothians, is an important source of liquid fuels and paraffin wax; ammonia fertilisers are also produced and bricks are made from the spent shale. In the past ten years the output of oil shale rose from about 1.6 million tons in 1938 to 1.78 million tons in 1942 and then declined to 1.24 million tons in 1947. The quantity of crude oil and naphtha produced from shale at the four retorting plants varied proportionately, and amounted to approximately 25.5 million gal. in 1947, which was nearly 14 million gal. less than the quantity produced in 1942.

The cause of the fall in oil shale production in recent years has been wastage of manpower, which was mainly due to the better conditions of employment in the coal mining industry. The number of underground workers in the shale industry dropped from 1846 in 1942 to 1468 at the end of 1947. To improve recruitment better conditions of labour and increases in wages were introduced in May, 1947, by agreement between the National Union of Shale Miners and Oil Workers and Scottish Oils, Ltd., the company operating shale mines in Scotland.

Refining

In 1947 refining operations were carried on at Pumpherston, Grangemouth and Ardrossan. The Pumpherston refinery treats crude petroleum from the oil wells at Dalkeith and in Nottinghamshire and Lancashire, as well as crude oil and naphtha from shale, and the Grangemouth and Ardrossan refineries also treat imported petroleum oils. During the war years the total production of liquid products in Scotland declined to a low point of 32.9 million gal. in 1945, but has recovered rapidly in the past two years. In 1947 it amounted to 123.6 million gal. or only 5.4 million gal. less than in 1938 and was about 23 per cent of the total amount of liquid products refined in the U.K. in that year.

Production of solid products followed a similar course to that of liquid products, the lowest annual figure being 43,000 tons in 1943. In 1947 the output of solid products totalled 83,000 tons, consisting mainly of bitumen (71,000 tons) and paraffin wax (8000 tons), and was 18 per cent of the total U.K. production of solid petroleum products.

Within recent years the Pumpherston refinery has been overhauled and brought up to date. New crude oil distillation units have been erected, and a new extraction plant has been set up. A new plant for the production of detergents has just been completed. The present capacity of this plant is about 3000 tons of detergents per annum. Plans for an important extension of the Grangemouth refinery, which will also provide for the derivation of a number of chemical products, are under consideration.

Iron and Steel

Steel production in Scotland suffered less than the rest of the U.K. from the fuel crisis in 1947. The output of ingots and metal for castings rose by 7 per cent from the 1946 level while production in Britain, as a whole, remained practically static. The following table brings up to the end of 1947 the information on production given in last year's review.

PRODUCTION OF STEEL INGOTS AND METAL

Year	Production (mil. tons)	Percentage of U.K. production	Indices of Scottish steel production (1935-39=100)
1935-39* ...	1.67	14.3	100.0
1940 ...	2.02	15.6	121.2
1941 ...	1.85	15.0	110.9
1942 ...	1.9	14.6	113.3
1943 ...	2.03	15.6	121.8
1944 ...	1.86	15.4	111.8
1945 ...	1.75	14.8	104.8
1946 ...	1.76	13.9	105.8
1947 ...	1.88	14.8	112.7

* Yearly average.

(*Continued overleaf*)

Figures of annual production of pig iron in Scotland are given in the following table.

SCOTTISH PIG IRON PRODUCTION

Year	Production (mil. tons)	Percentage of U.K. production	Indices of Scottish pig iron production (1935-39 = 100)
1935-39* ...	0.46	6.1	100.0
1940 ...	0.66	8.0	145.2
1941 ...	0.51	6.9	112.6
1942 ...	0.50	6.4	109.3
1943 ...	0.49	6.8	107.3
1944 ...	0.51	7.6	113.0
1945 ...	0.54	7.6	119.4
1946 ...	0.60	7.8	132.8
1947 ...	0.59	7.6	130.4

* Yearly Average

Iron Founding

A survey completed in December, 1947, showed that the total number of iron foundries in Scotland was 183, the majority being in Glasgow and the Falkirk districts.

Approximate output of all grades of iron castings amounts to 32,500 tons per month, needing the supply of 23,700 tons of pig iron and 14,200 tons of scrap. Hard coke is required at a rate of 7000 tons per month. The survey showed that, with few exceptions, the allocations of raw materials were accepted as reasonable, but actual deliveries of both pig iron and coke were irregular. In the case of coke the shortage was ascribed to a lack of railway wagons; in the case of pig iron to a general production shortage together with transport difficulties. In addition, supplies of scrap, particularly of good machinery scrap, remained scarce.

Peat

There are some 2700 sq. m. of peat in Scotland, of which about 100 sq. m. capable of yielding some 300-350 million tons of air-dried peat may be commercially workable. Many of these deposits, however, are situated very far from centres of population and labour, and any attempt to work them would be difficult.

The question of developing Scottish peat resources has recently been studied. By a process developed by Peco, Ltd., it is possible to produce peat briquettes from milled peat. By-products such as peat wax also offer prospects for exports or for home use. Experiments in the production of insulating material are also taking place. In the central industrial belt, however, difficulty has been encountered in maintaining an adequate labour force for hand-cutting. Mechanical methods of winning and processing would ease these difficulties.

Refractories

Scotland makes an important contribution to the U.K. production of refractory products. J. G. Stein & Co., Ltd., Bonnybridge, is the largest manufacturer in Britain of basic bricks with an output of 17,500 tons per annum. In 1947 the production of fireclay refractories in Scotland was 360,000 tons, equal to about 40 per cent of the U.K. output. This figure is not the production capacity of the industry, as output was limited throughout the year by shortage of labour, especially miners. The labour force is at present approximately 3600. In view of the continuing heavy demand for refractory products of all types, it is hoped that the special measures taken to overcome the housing problem will result in increased production in 1948.

Linoleum

Scotland accounts for over half the linoleum produced in the U.K., and the main centre of the industry is Kirkcaldy. There is still a very heavy demand, but efforts to produce more are hampered by shortages of raw materials, principally linseed oil and hessian. There was an improved supply of oil in the latter months of 1947. Leading firms in the Scottish linoleum industry are pursuing research into the possibilities of certain substitutes for linseed oil, and another firm is starting to produce (for export only) a linoleum-like floor covering with a plastic compound in place of linseed oil.

Cement

During the spring of 1947, when there was a general shortage of cement owing to the coal crisis, Scotland perhaps suffered more severely than the rest of Great Britain, because of shipping difficulties. There are only four firms manufacturing cement in Scotland. These use locally produced blast furnace slag, locally produced cement clinker, and cement clinker brought by sea from the south of England. Maximum output is about 4500 tons of cement a week.

Industrial Research

Last year's review stated that the volume and variety of industrial research in Scotland was not sufficient to ensure healthy industrial development, and that Scottish manufacturers needed encouragement and help to make the best of the facilities available to them for the application of scientific knowledge to their industries. Since then, the prospects of industrial research in Scotland have very considerably improved.

The branch office of the DSIR was established in Edinburgh in July, 1947, and, in addition to co-operating with other Government departments in Scotland, and with other organisations interested in research and its application to industry, is actively engaged in making contacts with Scottish firms and assisting them to make use of the laboratories and information services of the Department and the research associations.

SPANISH CHEMICAL PROGRESS—II

Spanish-Portuguese Collaboration in Pharmacy*

DR. Vadillo, in later passages in his widely-based study of Iberian pharmaceutical products listed many important organic synthetics now being made in Spain and Portugal including vitatmin K. Turning his attention to the inorganic field, he noted that mercury compounds are now being produced on an increasing scale. Now, instead of exporting only the raw material, an important industry was based on products such as calomines, cyanide and oxycyanide, corrosive sublimate, etc. Here, too, some export trade has been developed, and Spanish competition was being felt in the world markets.

Conditions in regard to bismuth salts are not quite so favourable, and, although several factories are now manufacturing them, production is adversely affected by lack of regular supplies of metallic bismuth. This disability exists in other directions also, especially in the lack of chlorine which cannot easily be imported. It is hoped, however, that the position will be easier now that a new chlorine factory is starting operations in Guipuzcoa (Prov.).

Limited Output of Sulpha Drugs

Five factories are making sulphanylamide, -amidopyridin, and -amidodiazol; but the sulphamides generally are restricted by continued shortage of chlorosulphonic acid. These shortages of certain raw materials for fine chemicals and pharmaceuticals are taken to illustrate the more rapid development of this branch of chemical industry as compared with that of heavy chemicals in Spain.

In some respects growth of the latter has, however, been of considerable help in production of fine chemicals. The increasing manufacture of plastics and synthetic resins in Spain, for example, has stimulated production of pharmaceuticals based on such things as formaldehyde and phenol, *e.g.*, salicylic acid, coumarin, and salipyrine also indirectly the new product, Rubofren (trimethoxy-dioxy-oxotritane), some of which has been exported during the first half of this year.

The recent development of artificial fibres has assisted corresponding development of fine chemicals based on acetic anhydride and acetylation products, *e.g.*, aspirin, for which a new factory has just been put in operation.

Spain has always been noted for its saline resources, especially of common salt, in solid or liquid form, ensuring among other things adequate supplies of bromine and lakaline bromides, in addition to sodium chloride. Conversely, the growth of certain fine chemicals has assisted similar growth in the heavy chemicals, which Dr. Vadillo exemplifies with anaesthetic ether and hydrogen peroxide, the latter especially being of particular importance in the development of perborates manufacture now established on a large scale in Spain. Here again an export trade can be built up if supplies of caustic soda can be made available.

Reagents and Antibiotics

In the field of pure products and analytical reagents much progress has been made as shown by the statistics which, in the case of acids and ammonia alone, revealed for 1943 output of 225 tons, compared with nil a few years earlier; output of crystalline products and various reagents exceeded 35 tons.

The manufacture of sera, vaccines, and antibiotics has also shown substantial advance, as a result of the research of Profs. Bustinza and Caballero Lopez and others, with streptomycin chloride in solid form from cultures of *S. griseus*. More recently usnic acid, in dextro-crystalline form, has been prepared from *Usnea barbata* (one of the Spanish lichens), and also the sodium salt, both being strongly anti-bacterial.

Streptomycin usnicate appears to be specially effective against the tuberculous bacillus, and has evoked some interest in leading American laboratories. Another interesting product is rutine in crystalline form from the flavonolic glucoside; also quercetine and its sodium salt, with marked antibacterial activity, *e.g.*, against various species of *Mycobacterium*.

Penicillin

Much progress has also been made in Spain with penicillin, for which a small pilot plant has been working for some time in Barcelona. It is proposed, from the experience so gained and in connection with the grant of patent rights by a leading European firm, to establish the manufacture of penicillin on a large scale (with an annual output of some 25 million ampoules of 100,000 units). This would be about three times the estimated consumption for 1949 of pure crystalline penicillin containing 1650 u.o. per mg., stable to both light and heat. The project will cost about 25 million pesetas, and the agreement with the foreign firm includes facilities for study and re-

(*Continued overleaf*)

* The first part of this review appeared in our issue of July 24, pp. 121-122.

search by Spanish chemists. The cost to the public per ampoule, or 100,000 u.o., will be about 10 pesetas.

The first Luso-Espanol (Portuguese-Spanish) Pharmaceutical Congress, held in Madrid in June, appears to have been entirely successful. (*El Monitor de la Farmacie*, June 20 and July 3.)

Among a long list of resolutions adopted, it was decided to appoint a commission (Luso-Español) to study deficit raw materials in the Iberian peninsula; to award prizes at the next congress for the best papers on chemico-pharmaceutical industries based on acetylene derivatives; to publish a *Codex alimentarius* to include official methods of analysis for foods and drugs, and suggested means of better control and standardisation; to urge upon the Governments the publication of a *Flora Medicinal de Portugal y de España*; to form an Hispano-Portuguese Biochemical Society, which would publish a review, and an Iberian Society for the History of Pharmacy, and a Federació Hispano-Lusa-Americana for all pharmacists of Spanish or Portuguese nationality and language (*i.e.*, including S. American).

It was proposed generally to take all necessary steps, from universities downward, to raise the standard and status of study and training of pharmacists. A commission is also to be set up jointly by the two countries to study unifications or standardisation of methods of biological assay, to be incorporated in the proposed Spanish-Portuguese Pharmacopæia.

Documentation and research in special lines formed the subject of other resolutions, some of which were concerned with medicinal plants and their culture.

In view of the proposed creation of the organisations mentioned, the need for a Cuerpo (body) Nacional de Farmacia (resolution 45) is not very clear. Closer relations with other branches of industry and science, *e.g.*, fine chemicals and chemical industry generally, and medicine, botany, microbiology, etc., were provided for.

The exhibition itself, held in conjunction with the Madrid congress, was divided into six principal sections, of which the historical and the bibliographical-artistic were of particular interest, and occupied in all some 890 square metres, with 96 stands. About 80 of these were furnished by 31 firms. The historical section illustrated the growth of Spanish pharmacy from earliest times, and included a fine collection of Italian ceramic flagons and other memorials of the 17th and 18th centuries.

NUCLEAR PHYSICISTS TO SERVE U.S. INDUSTRIES

AN atomic energy division which will specialise exclusively in nuclear engineering problems and whose activities will be directed by Dr. Karl Cohen, former director of the theoretical division of the Manhattan Project Laboratory, has just been formed by the H. K. Ferguson Company, the New York industrial engineers.

Initially, it will accept contracts only from the U.S. Atomic Energy Commission and its subcontractors, but eventually it contemplates undertaking consulting work for private industry. It intends also to work on original problems of nuclear science on its own initiative. It foresees the need in the future of serving as consultants for clients who want to investigate the possibilities and effects of atomic energy applications in their industries, such as the use of radioactive tracers, economic aspects and other atomic engineering problems.

Among its initial assignments, the Atomic Energy division will participate in the engineering and construction of the first peacetime atomic pile now being built by the Ferguson company at Brookhaven National Laboratory, Upton, Long Island, New York. There, Dr. Lyle Borst, designer and director, has announced that the pile is now nearing completion and it is expected that the first atomic plant able to make electric power will start running in December. Electrical output is expected to be about 2500 kW.

During the war, the Ferguson company was one of the major participants in the Oak Ridge, Tennessee, atomic development, and designed, built, and operated the thermal diffusion plant used for the production of uranium-235.

ATTACK ON VIRUS DISEASES

DR. Wendell Stanley, Nobel Laureate in chemistry, and founder of modern virus research, has joined the faculty of the University of California as professor of biochemistry. He will direct a new virus research laboratory, the first of its kind to be established by a university. At the last session of the State Legislature an appropriation of $500,000 was voted for the construction of a special laboratory.

An extensive programme of research on viruses affecting plants, animals and humans will be undertaken. The programme will have ramifications in every field where viruses are known to be involved, particularly in medicine and agriculture.

A CHEMIST'S BOOKSHELF

Chemical Engineering Economics. By Chaplin Tyler. Third edition. 1948. New York: McGraw-Hill Book Co., Inc. Pp. 321. U.K. price 24s.

For over 20 years this successful text has held a front-rank position in the field. An innovation in the new edition is the collaboration of 14 experts in various fields, which has made the book much more useful and authoritative than its predecessors. Headed by the editor, member of the Development Department, E. I. du Pont de Nemours & Company, the work is a co-operative effort of various authors well co-ordinated so far as subject-matter is concerned. Of the 15 chapters, the first surveys the characteristics of the chemical and allied industries, classified into two groups: production based essentially on change in physical, and in chemical form. The following chapters cover phases of economics, research and development, plant location, plant design, operative investment, process equipment costs, economic balance, heat and power, plant operation and control, cost accounting, market development and research, market organisation and management. The last chapter deals with patents. The book covers a subject, which has otherwise been dealt with very sparsely in published literature. Although written for American conditions, it will certainly be appreciated in this country for its practical applications. The value of the book is enhanced by the inclusion of many figures and tables, a comprehensive bibliography and a full index. The volume will find a place in the libraries of chemical institutes and chemical works.

* * *

Woodflour. By W. S. Dahl. Published by the author (30 Stanley Road, Mortlake, London, S.W.14). Pp. 120. Price 21s.

The book presents an account of the manufacture of woodflour, its functions and many modern uses, with special reference to its use in plastics, linoleum, and tinplate polishing and cleaning. Special chapters are added on lignin plastics and uses for unground sawdust and woodwaste. The author, who has spent his life in the timber trade, has collected and made accessible in convenient book form a large amount of information on this subject, in which he is an expert, and much of the material has not previously been published. The book will therefore serve a useful purpose in pointing the way to an expansion of the uses of wood waste, which is accumulating on such a scale that prize competitions have been arranged to find economic means of dealing with it. The first more mechanical uses have extended into chemical industries, including processes such as the production of alcohol and the new uses for extracted lignin, which latter is finding an ever-expanding field of usefulness. The book, dealing with more than 35 uses and containing more than 50 illustrations, is a useful contribution to a subject of considerable economic importance. It affords a great deal of technical information which has not formerly been readily available.

* * *

Numerous new books on organic chemistry, translated from the German, published and distributed with the consent of the Alien Property Custodian, are announced by Interscience Publishers, New York-London. Among the authors or editors are W. Theilheimer, Ernst David Bergmann, A. Weissberger, and Conrad Weygand.

Tar Research

Road Tar Bulletin, No. 4, based on research by the Road Research Laboratory, DSIR, and the British Road Tar Association, which the latter organisation has now issued, forms an important link in the series of essentially practical studies of tar in one particular connection. The fourth bulletin provides a very detailed examination of the bases on which depend the adhesive characteristics of tars and consequently their effectiveness as a binder of road surfaces. The text and ample illustrations are well designed to tell the story with great clarity, in a way intelligible to all. It deals at length with the interesting and extremely practical physical problem of securing adhesion between surface dressings and various kinds of aggregate when rain tends to prevent bonding.

American Chemical Notebook

From Our New York Correspondent

ADDRESSING the International Congress of Crystallography at Harvard University recently, Prof. L. G. Berry, of Queens University, Kingston, Ontario, said that he had "grown" minerals in his laboratory to study the framework of atoms under controlled conditions. Prof. Berry said that among the minerals thus produced were compounds of lead-antimony-sulphur and copper-selenium, and he had synthesised the minerals by using a water solution at high temperatures and under pressure. With these crystals he had been able to study the "systematic variation" of their properties as chemical composition varied. This enabled him to make observations, under controlled conditions, regarding colour, crystal form, solubility, and other factors.

* * *

Four U.S. Government-owned patents relating to developments in the chemical, drug and plastics fields have been made available by the Bureau of Agricultural and Industrial Chemistry for licensing on a royalty-free, non-exclusive, non-transferable, and revocable basis. One of these patents, No. 2,432,638, offers a method for the isolation of penicillin. Penicillin is present in extremely small quantities in biological fluids, such as the fermentation liquor resulting from the culture of penicillin-producing moulds. The patent covers a method for the recovery of penicillin by adsorption from the neutralised and filtered fermentation liquor on activated carbon. The carbon is then separated from the liquor and the penicillin eluted from the carbon with an aqueous solution of an organic aliphatic alcohol of at least 4 carbon atoms, having a substantial concentration of water; Patent No. 2,435,478 relates to polyamides of polymeric fatty acids and the polyamines obtained by hydrogenation of the nitriles of polymeric fatty acids. The products are hard, resinous solids, or tough, rubbery substances which become hard and resinous at low temperatures and are suitable as bases for rubber substitutes with good low temperature characteristics.

* * *

The other two patents are:—No. 2,436,659, covering a process by which d-saccharic acid is made by nitric acid oxidation of d-glucose. A non-catalytic method is described in which a reaction mixture, containing 50 per cent to 70 per cent nitric acid, is employed at 55° to 90°C. The ratio of acid to glucose is about 3 to 8 moles of acid per mole of glucose. The process avoids the use of expensive catalysts and produces high yields: No. 2,437,946 describing a method by which prolamines such as zein are made into coating compositions, film, filaments, and moulded plastics. The products are clear, transparent, flexible, and waterproof. The solidifying compositions consist essentially of the prolamine as the film-forming or solidifying agency with an amide of lactic acid as plasticiser.

* * *

To assist the Colorado Fuel and Iron Corporation, now operating an Army standby plant at Denver, Colorado, to dispose of certain stocks of caustic soda held in storage, the U.S. Office of International Trade last week established a supplemental export quota of 4300 tons of caustic soda for the third quarter of 1948. The action was taken, OIT officials said, at the request of the U.S. Army to keep the plant in condition for an immediate resumption of production in the event of an emergency. Although the plant is strategically situated from a military aspect, it is some distance away from raw material sources and, in addition, high operating costs prohibit competitive selling prices in the caustic soda market. Previously, the price standard used by OIT in considering applications for export licences has debarred the firm's products from the export markets. The price regulation will not apply to the supplemental quota.

* * *

The Monsanto Chemical Company's latest financial report discloses that the sales during the six months ended June 30, 1948, showed an increase of 11 per cent over the same period in 1947, and net income amounted to $7,926,759 (equal to $1.73 a common share), against $9,275,133 last year. As in previous reports issued since the Texas City disaster, in April, 1947, earnings to April 16 this year do not include any insurance recovery for loss of profits resulting from destruction of the company's installations at Texas City. Recurrent expenses and certain outgoings to reduce losses which are recoverable under insurance policies have not been charged against earnings. The chairman, Mr. Edgar M. Queeny, states in the report that reconstruction of part of the Texas City plant is nearing completion and full production from that unit is expected to be reached this month. The company has declared the usual quarterly dividend of 50 cents on the common stock, payable September 1, a $1.00 quarterly dividend on the series B preference stock, and the usual semi-annual dividend of $1.62½ on the company's series A preference stock.

Home News Items

BoT Nitrate Destroyed.—More than 200 tons of nitrate chemicals belonging to the Board of Trade were destroyed by a fire which occurred at Millwall Docks on Tuesday.

Vesting Date for Gas Industry.—It is expected that the gas undertakings will pass to State ownership on April 1 next year. The Bill giving the Government nationalisation powers received the Royal Assent last month.

Accident at Dyemakers.—When his right arm was caught in a fan, Mr. James E. Garside was drawn into a dye pan and received serious injuries last week at L. B. Holliday & Co., Ltd., dyestuffs manufacturers, Deighton, Huddersfield.

Cornish Tin Resources.—A report, sponsored by the newly-formed Cornish Mining Development Association, is to be sent to the Ministry of Fuel and Power urging the Government to finance assay work in connection with Cornwall's tin and other mineral deposits.

Tin Allocations.—The Ministry of Supply announces the following interim allocations of tin for the second half of 1948, additional to those announced last month. Brazil 420 tons, Ceylon 20 tons, Egypt 165 tons, Finland 100 tons, Germany-Bizone 500 tons, Hong Kong 65 tons, Korea 20 tons, South Africa 160 tons, total 1450 tons.

Copper May Cost More.—The prospect that the maintenance in the U.S.A. of the new price of 23½ cents per lb. for electrolytic copper will enforce some increase in the Ministry of Supply home charge of £132 per ton is considered likely. In sterling equivalent, U.S. copper is now worth £3 more than the British official price.

1000 Tons of Rubber Destroyed.—Four sheds, containing about 1000 tons of reconditioned tyres and rubberised cloth, were destroyed by a fire which lasted for more than eight hours at premises in Wearish Lane, Westhoughton, near Bolton, last week. Several fire brigades were needed to control the blaze.

Council Seeks Chemical Contractors.—Applications are being invited by the Supplies Department of Essex County Council from manufacturers of chemicals and laboratory equipment to be included in the council's list of approved contractors. Particulars are obtainable from the Supplies Officer, Essex County Council, Old Court, Arbour Lane, Springfield Road, Chelmsford, Essex.

Paint Works Explosion.—Mr. H. L. Darnell, chief chemist, Bryce, Weir, Ltd., Watford, was seriously injured last week when a 100 gal. vat of varnish exploded at the works. A youth, Jack Dandridge, of Radlett, received burns on the face and hands.

Chemical Import Duties.—Many changes, including some substantial reductions of Czechoslovakian import duty and some additions to the free list in respect of a wide range of basic chemicals are recorded in the current *Board of Trade Journal*, derived from H.M. Embassy at Prague. Most of the new rates have effect only until the end of the current year.

More British Coal for Sweden.—According to a Stockholm radio report, Lord Hyndley, chairman of the National Coal Board, while visiting Sweden for negotiations with the Government, promised a "substantial increase" in U.K. coal deliveries to Sweden next year. He expressed the hope that Britain would again be able to supply the bulk of Sweden's coal and coke import requirements.

Glaxo in Johnnesburg.—Glaxo Laboratories, Ltd., Greenford, Middlesex, announces the incorporation of a new subsidiary company in South Africa under the name of Glaxo Laboratories (S.A.) (Pty.), Ltd. The main office is at 3 Maasco House, 8 Smal Street, Johannesburg. Mr. A. L. Birchley, formerly a home sales executive, has been appointed managing director of the South African company.

Standard for Burettes

British Standard 846, Part 3, covers burettes of 5, 10 and 25 ml. capacity with pressure filling device and automatic zero, for use in micro-chemical work. Full dimensions and tolerances are given. This specification is one of a series for micro-chemical apparatus which is being prepared at the request of the British Laboratory Ware Association.

The apparatus is designed to enable the burette to be filled with standard solution from the storage bottle, to provide automatic zero-setting of the liquid surface in the burette, and to protect the solution in the storage bottle, during transfer to the burette and while in the burette, from contact with the carbon dioxide of the atmosphere. The specification may be obtained from the British Standards Institution, Sales Department, 24 Victoria Street, London, S.W., price 2s. net, post paid.

New Spectrographic Studies

WORKING at the United States National Bureau of Standards, Dr. C. C. Kiess, of the Bureau, and Dr. George Shortley, of the Ohio State University, for the first time have succeeded in measuring precisely the Zeeman effect of neutral nitrogen and oxygen.

When the Zeeman patterns of such metals as molybdenum, tantalum, and manganese, are photographed in the red and infra-red regions of the spectrum, there usually appear also on the spectrograms the patterns of atmospheric nitrogen and oxygen. The relative positions and estimated intensities in the magnetic patterns of these lines have now been determined for the first time from precise measurements of spectrograms by Drs. Kiess and Shortly.

The interpretation of these measurements has afforded an interesting application of the quantum theory to the elucidation of the Paschen-Back effect, the Bureau states. The *g*-values derived for the nitrogen and oxygen energy levels are the first to be announced for neutral atoms of atomic number less than 10, or neon, and are found to conform with those required theoretically for the lighter chemical elements.

SYNTHETIC RESINS

THAT large expansion of production of synthetic resins could now have taken place, but for the delays associated with industrial expansion under present conditions, was made clear by Mr. H. E. Potter, managing director of Bakelite, Ltd., in his annual report to shareholders. The company, the nominal capital of which was recently increased to £1 million, is about to put into production some of the new equipment for the production of phenolic plastics at Aycliffe, Co. Durham. Although construction at the research and development centre at Tyseley will not be complete until next year, the company continues to build up its staff of chemists, physicists and technicians, some of whom may later be occupied with a project for the manufacture of synthetic phenol.

Non-Ferrous Metals in June

Ministry of Supply statistics relating to light metals in June have been issued (in long tons) as follows: Virgin aluminium, production 2528, imports 15,240. Secondary aluminium, production 6403. Uses (aluminium scrap arisings): 20,927, consumption 8549. Aluminium fabrication: 19,566. Magnesium fabrication: 249.

Personal

MR. CHARLES JAMES HENSHAW, Ashton-under-Lyne, retired works chemist of Thomas Kerfoot & Co., Ltd., left £5661 (net £5621).

BRIGADIER-GENERAL WILLIAM FREDERICK MILDREN, chairman of Imperial Paper Mills, Ltd., and a director of Amalgamated Press, Ltd., left £222,403.

MR. W. C. WAUGH, Purley, Surrey, formerly of Lyndhurst, Huby, near Leeds, chemical merchant, and director of Walter Waugh & Co., Ltd., Albemarle Street, London, and of other companies, left £31,208 (net £27,036).

MR. R. MCCHLERY, former Rhodes Scholar and, since 1926, a member of the Agricultural Department, Salisbury, has been seconded to the Central African Council to take up the new appointment of Central African scientific liaison officer in the United Kingdom, and to establish a Central African scientific liaison office in the British Commonwealth of Nations Scientific Offices, London.

Obituary

SIR CLIFFORD COPLAND PATERSON, who recently returned from Australia, where he had been acting as contact between British and Australian scientific bodies, has died in the Watford Peace Memorial Hospital, aged 68. Educated at Mill Hill School and Faraday House, Sir Clifford spent 17 years on the staff of the National Physical Laboratory before founding the research laboratories of the General Electric Company in 1919. A past-president of the Institution of Electrical Engineers and Faraday Medallist in 1945, his research contributions in a period of some 45 years greatly extended the scope of sources of illumination and means by which illumination can be precisely measured.

During the war he co-ordinated the activities of a number of teams which afforded notable developments in the use of high radio frequencies which had a practical application in new weapons. He performed equivalent work in similar fields during World War I. In 1946 he was awarded the James Alfred Ewing Medal by the council of the Institution of Civil Engineers for his work in engineering research, and a few weeks ago the Illuminating Engineering Society of America, awarded him their gold medal.

Overseas News Items

Norwegian Aluminium for Russia.—About 1000 tons of aluminium have recently been shipped to Russia from Norway and further consignments are expected to follow as a result of current trade discussions.

Big Soda Production in Poland.—Poland is reported to have produced some 100,000 tons of soda in the current year, sufficient for domestic requirements and to provide an export surplus.

Hungary Increases Fertiliser Output.—Production of fertilisers from the Pét plant in Hungary during April amounted to 28,820 tons, an increase of 700 tons on the previous month.

Cement and Chemical Controls Removed.—In recognition of the great improvement in the output of Portland cement, the Italian Government has abolished all priority allocations. For the same reason the trade in fertilisers and calcium carbide is to be free.

Record World Oil Output.—According to statistics collated by *The Oil Forum*, daily average crude oil production throughout the world in April reached a new record yield of 9,090,075 barrels, which is 13 per cent higher than during the same period in 1947.

Food Regulations Offence.—A Reuter report from Lagos states that the Nigerian Supreme Court has fined the United Africa Company, a subsidiary of Lever Brothers and Unilever, Ltd., a total of £90,000 for overcharging under the food regulations. It is understood that the company will appeal.

Iranian Oil Yields.—Crude oil produced in Iran by the Anglo-Iranian Oil Company in June amounted to 2,041,000 tons. This compares with 2,228,000 tons in May. Total production for the six months ended June 30 last was 11,476,000 tons, against 9,399,000 tons during the same period of 1947.

Italy's Synthetic Wood Production.—The Italian Association of Synthetic Wood Manufacturers has appealed to the Government to stop the importation of synthetic wood products. During the latter half of last year Italian producers of masenite, faesite, etc., experienced difficulty in selling their products and stocks rapidly accumulated.

Brazilian Fertiliser Imports.—Brazilian imports of calcium superphosphates in the first two months of 1948 totalled 11,918 metric tons, valued at $415,800, according to customs statistics. This material was among the 10 commodities registering the greatest increase in volume over those imported in the corresponding period of 1947.

Quartz Deposits in Norway.—Large deposits of quartz crystals are reported to have been discovered in Bardu in Northern Norway. The area is said to contain the largest occurrence in Europe.

More Sunflower Seed.—It is officially estimated that the 1947-48 sunflower-seed crop in Argentina will total 988,100 metric tons, comparing with 688,200 tons harvested last season.

Canada Increases Petroleum Output.—According to the Bureau of Statistics, Canadian production of refined petroleum products in April, totalled 5.81 million barrels, an increase of 842,000 barrels on the April, 1947, output.

Dyestuffs Plans.—Dyestuffs production by Czechoslovakian factories, virtually all of which are now State enterprises, is reported to have totalled 24,000 tons in 1947. Present production plans propose that current production should be doubled by 1953.

Canadian Fertiliser for Egypt.—An agreement, recently concluded between several Canadian companies and the "Credit Agricole d'Egypte," provides for the shipment to Egypt of 50,000 tons of fertiliser each year from July 1948 until June 1950.

Oil Official Released.—Mr. E. Boden, general manager of the Unirea Oil Company in Rumania, who was arrested by the Rumanian security police last week, has now been released. While in custody he was questioned at length on the activities of his company.

Italy's Power Production.—Italy is at present the world's fourth largest producer of hydro-electric power. Since the beginning of the year output figures (in million kilowatts) were: January 1476, February 1449, March 1480, April 1525, May 1686 and June 1744.

Rising Sulphur Production.—Production of native sulphur in the U.S.A. in May, 409,530 tons, was 4 per cent greater than in the preceding month and 9 per cent greater than in May 1947. Stocks decreased 40,640 tons during the month, and were 6 per cent lower than on May 31, 1947.

Canadian Lead and Zinc Prices.—Prices of lead and zinc have been raised by 2 and 3 cents a lb. respectively to 18.75 cents for lead and 14.75 cents for prime Western zinc delivered, the Consolidated Mining and Smelting Company of Canada announced this week. All other grades of zinc have been increased by a similar amount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

FORTIOR LTD. (formerly FORTIOR METAL HARDENING CO., LTD.), Mitcham, metal hardeners, etc. (M., 14/8/48).—June 18, deb., to Lloyds Bank Ltd., securing all moneys due or to become due to the Bank; charged on Fortior Works, Willow Lane, Mitcham, and general charge. Nil. Nov. 20, 1946.

SEMENYIH RUBBER ESTATE, LTD., London, S.W. (M., 14/8/48.) July 5, three charges, to Malayan Union Government Industrial Rehabilitation Finance Board securing all sums which the chargees may be called upon to pay under or by reason of a guarantee; charged on rubber estate in Semenyih, Negri Seremban. *Nil. April 22, 1947.

SUNGEI TIRAM RUBBER ESTATE, LTD. London, E.C. (M., 14/8/48).—June 23, charge, pursuant to an agreement dated May 4, 1948, securing to Industrial Rehabilitation Finance Board all sums which the chargees may be called upon to pay under or by reason of a guarantee; charged on land known as Sungei Tiram Rubber Estate, Kota Tinggi Road, Johore. *Nil. Nov. 11, 1947.

ANGLO-AMERICAN PHARMACEUTICAL CO., LTD., Croydon. (M., 14/8/48.) June 30, first debenture and a collateral Land Registry charge, to Westminster Bank Ltd., each securing all moneys due or to become due to the Bank; respectively charged on 9, 59 Dingwall Road, and land and buildings at rear of 11 Dingwall Road, Croydon, and general charge, and on land at Wellesley Grove, Croydon. *£4850. January 13, 1948.

Company News

The nominal capital of **Kent Chemical Co., Ltd.**, Station Road, Tenterden, has been increased beyond the registered capital of £100 by £4900 in £1 shares.

New Companies Registered

Smith-Morgan & Co. (Export), Ltd. — Private company. Capital £10,000. Manufacturers, importers and exporters of chemicals, waxes, paints, varnishes, polishes and preservative coverings, etc. Directors: Wilfred Smith and James B. Morgan, 10 Cranbrook Rise, Ilford. Reg. office: 16 Philpot Lane, Eastcheap, E.C.3.

Duckham's Associated Products, Ltd. (455,852).—Private company. Capital £100. Manufacturers, importers and exporters of chemicals, soaps, solvents, insecticides, petroleum products, etc. Directors: J. E. Duckham, A. N. Duckham, G. T. Joyce, A. C. Pepper, H. B. Taylor and J. O. Gardiner. Registered office: Capel House, New Broad Street, E.C.2.

Colour Applications, Ltd. (457,204).—Private company. Registered July 3. Capital £10,000. Manufacturers of and dealers in dyestuffs, fine colours, earth colours, chemicals, paints, pigments, printing inks, etc. Directors: Alexr. J. Mackenzie, James E. Hall, Leslie S. Mackenzie and Wm. J. W. Webster. Reg. office: 7 Chesham Place, S.W.1.

Young & Fogg Rubber Co., Ltd. (455,994).—Private company. Capital £10,000. Producers and dealers in goods made from latex, natural or synthetic rubber, etc., casein or cellulose acetate or plastic chemicals, etc. Directors: A. W. P. Fogg, 4 Birchwood Road, S.W.17, W. H. G. Young, E. S. Fogg, F. A. Marten and Wm. T. Anderson.

Duncan, Flockhart & Co., Ltd.—Private company. Registered in Edinburgh June 28. Capital £130,000. To acquire the business of manufacturing wholesale and retail chemists carried on by Henry J. Baker, Robert L. Kirkcaldie, Henry G. Baker and William J. Gray as "Duncan, Flockhart & Co." Directors: R. L. Kirkcaldie, W. J. Gray, Henry J. Baker, and Henry G. Baker. Reg. office: 104 Holyrood Road, Edinburgh.

Chemical and Allied Stocks and Shares

WITH stock markets slightly more active, values in most sections strengthened, although the best prices were not fully held. Among British Funds, 3 per cent Electricity stock eased to 101, after touching the new high level of 101 1/16. Industrial shares responded to better demand, attention being drawn to

the fact that in many instances yields are now at their most attractive levels since the end of the war. Nevertheless, prices receded later in the week.

Imperial Chemical have strengthened to 43s. 6d., sentiment still reflecting the directors' view that the 10 per cent dividend should be maintained on the larger capital. Dunlops touched 71s. 9d., United Molasses 47s. 6d., and the units of the Distillers Co. 26s. 9d., but later prices reacted slightly. Business around 20s 3d. took place in B. Laporte 5s. ordinary, Albright & Wilson were marked 28s. 3d., Fisons were 58s. and W. J. Bush ordinary shares, which are firmly held and do not change hands frequently, have been dealt in around 85s. Greeff-Chemicals Holdings 5s. shares transferred at 14s. 6d. and Monsanto Chemicals 5s. ordinary were 58s. 1½d. Burt Boulton & Haywood have shown business at 26s. 9d. and William Blythe 3s. ordinary marked 18s. 6d.

Elsewhere, however, British Match shares eased to 34s. 6d., Triplex Glass 10s. ordinary strengthened to 24s. 10½d., the market expecting the past year's results to show higher profits, although, owing to dividend limitation, shareholders will probably not receive more than the previous year's 10 per cent. British Indestructo Glass 2s. shares have remained steady at 3s. 3d. on further consideration of the past year's improved results. At 47s., British Aluminium held their recent improvement, General Refractories have been steady at 21s. 6d., Amalgamated Metal shares also little changed at 18s. 10½d., and British Oxygen, after easing to 97s. 6d., firmed up to 98s. 1½d. Turner and Newall were 74s. 6d. and Murex, at 86s. 3d., were helped by the full results.

British Glues & Chemicals 4s. ordinary held steady at 18s. 9d., it being pointed out in the market that there would have to be a very heavy reaction in profits to necessitate a future cut in the 25 per cent paid in each of the past two years. Fully 85 per cent has been earned on the shares. Lever & Unilever at 48s. 9d. have remained firm on further consideration of the consolidated accounts, while Lever N.V. were 49s. 6d.

Iron and steel gained a few pence, helped by the better trend of markets, United Steel being 27s. 9d., Dorman Long 30s., and Guest Keen, helped by the higher profits and maintaned 11 per cent dividend, rose to 46s. Babcock & Wilcox firmed to 66s., and T. W. Ward to 57s. 9d. while George Cohen 5s. shares (19s. 9d.) were helped by the advance in profits and 20 per cent dividend. Boots Drug have rallied well to 50s. 9d., and British Drug Houses 5s. ordinary strengthened to 8s 9d. Beechams deferred were firmer at 19s. 7½., Sangers 29s. 9d. and Timothy Whites 35s. British Xylonite were £5½, British Industrial Plastics 2s. shares 6s. 10½d., De La Rue 38s. 9d. and, following the latest developments, P. B. Cow shares have moved up to 17s. 6d.

Oils became irregular, with ordinary Anglo-Iranian and Shell lower on balance.

British Chemical Prices

Market Reports

ACTIVITY in the industrial chemical market remains under the influence of the holiday season but an increasing interest in new business is already noticeable and delivery specifications and existing contracts are again receiving the attention of consumers. Export trade has hardly been affected by seasonal influences and the volume of overseas inquiry is reported to be very satsfactory. So far as values are concerned there have been no important price changes and most sections of the market continue on a firm basis and the supply position, too, is unchanged with the soda alkalis continuing tight. The coal-tar products market is without feature and any contraction in activity is seasonal.

MANCHESTER.—Trading conditions on the Manchester chemical market during the past week have been livelier, after the seasonal lull. Bigger supplies of both light and heavy chemicals have been moving into consumption at Lancashire textile and other using establishments against orders already on the books. Replacement buying, covering a fairly wide range of products, has also been more in evidence. All the alkali products are wanted in substantial quantities and in some of them a tight supply position continues. Inquiry on export account has been of fair extent. A certain amount of forward buying has been reported in the fertiliser trade, and in the tar products market the demand for most lines has been steady.

GLASGOW.—Business in the Scottish chemical market has remained quiet, although conditions are gradually returning to normal after the holidays. Normal conditions are likely to prevail during the coming week. There has been a heavy demand for sodium chlorate and for substitute weed-killers of a non-poisonous type. The demand for solvents and all classes of coal-tar products has been well maintained. In the export market there has been a steady demand for all classes of chemicals, with demand for bleaching powder still far exceeding available supplies.

Industry and the Profits Tax

Present Scale of Assessments and Allowances

NOW that the seasonal influx of company reports adds weight to the mailbags and occupies more than the usual amount of Press space, the term "profits tax" appears with unfailing regularity. This circumstance calls for a brief survey of the operation of the levy in its present form, as certain important changes in the applicability of the tax—originally the National Defence Contribution—have been made by three Finance Acts, two passed in 1947 and one this year.

The present rate of taxation is 25 per cent on profits distributed to shareholders and 10 per cent on profits placed to reserve or used in the business. These rates apply to profits made after December 31, 1946. Profits up to that date are taxable at the old rate of 5 per cent for companies and 4 per cent for other concerns.

Special Deductions

The wear-and-tear percentage allowances for machinery or plant (the term is a wide one including motor vehicles, fittings and fixtures) are claimable under the Profits Tax scheme just as they are under the Income Tax regulations.

The allowances for the Income Tax Act 1945, now apply also to Profits Tax, and comprise the "initial allowance" of 20 per cent of the capital expenditure where machinery or plant (new or second hand) is installed; the "initial allowance" for new industrial buildings of 10 per cent and 25 per cent per annum for buildings erected during the past 50 years and the "balancing allowances," given where fresh machinery is installed before the capital expenditure on the old machinery has been fully taken by the ordinary allowances.

What is known as "rehabilitation expenditure" is allowable, and includes such items as the return of evacuated businesses to former or other locations, the re-adaptation of buildings, machinery or plant from war to peace time pursuits and the removal of A.R.P. installations, although there are time limits for these deductions. These limits have been altered by the 1948 Finance Act and the applicant has now been allowed until March 31, 1952, to complete any unfinished work of this type and qualify for allowances, provided he renders a preliminary statement to the Tax Commissioners before the end of March next year.

Expenditure on salaries, materials, repairs and maintenance in connection with scientific research is allowed as a trading expense, and capital expenditure on pilot plants and laboratories is also allowed by instalments spread over five years.

In addition contributions, even of a capital nature, made to a college or university, etc., for technical education, are deductible, if the recipients are engaged upon activities connected with the taxpayer's trade. Expenditure in obtaining a patent or registering a design or trade mark can also be deducted.

For a director-controlled company, deductions for directors' salaries are restricted to 15 per cent of the profits (with a maximum of £15,000) computed before remuneration is made, or £2500, whichever is the greater.

This restriction does not, however, apply to full-time directors who do not own more than 5 per cent of the ordinary share capital.

Profits up to £2000 per annum are exempt from Profits Tax, and relief can be claimed where profits exceed £2000 but are under £12,000. This rebate is calculated on one fifth of the difference between the actual profits and £12,000. For example, if the actual profits amounted to £4000, this is deducted from £12,000 and one fifth of that £8000 difference (£1600) is in turn deducted from the actual profits—which means that £2400 would be liable for tax.

Originally, investment income was not assessed under Profits Tax. This has now been changed and all such income is chargeable, except income already taxed e.g. coming from companies already chargeable with Profits Tax. It should be noted, however, that this is taken into account in computing the £2000 for exemption purposes and in connection with the abatement provisions.

Assessment Procedure

Assessment procedure approximates closely to Income Tax rules but there are certain important differences. For example, profits are for the current year and do not relate to the preceding year's income as under Schedule D (I.T.); the annual value where premises are owned is not deducted for Profits Tax as it is for Income Tax and while Profits Tax payments are deducted for Income Tax, Income Tax payments cannot be deducted for Profits Tax.

On December 31, 1946, individuals and partnerships—small concerns— were taken out of this taxation field, as the tax yield from these firms had always been less than 5 per cent of the whole product of the tax.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Azo-dyestuff.—Imperial Chemical Industries, Ltd., and M. Mendoza. Dec. 5, 1945. 604,831.

Azo-dyestuff.—Imperial Chemical Industries, Ltd., and M. Mendoza. Dec. 5, 1945. 604,832.

Anthraquinone dyestuffs.—Imperial Chemical Industries, Ltd., and W. W. Tatum. Dec. 5, 1945. 604,833.

Adhesive compositions.—Imperial Chemical Industries, Ltd., T. J. Meyrick, and J. T. Watts. Dec. 5, 1945. 604,834.

Continuous manufacture of nitroglycerine and the like explosive liquid nitric esters.—Imperial Chemical Industries, Ltd., and F. A. F. Crawford. Dec. 7, 1945. 604,874.

Manufacture of pigments.—Imperial Chemical Industries, Ltd., and J. Glassman. Dec. 7, 1945. 604,875.

Conductive vitreous articles and their manufacture.—British Thomson-Houston Co., Ltd. Dec. 11, 1944. 604,878.

Copolymers of vinyl compounds.—British Thomson-Houston Co., Ltd. Dec. 11, 1944. 604,879.

Preparation of 5-diethylamino-2-pentanone.—U.S. Industrial Chemicals, Inc. Feb. 21, 1945. 604,884.

Sulphonamide derivatives. — Wellcome Foundation, Ltd., and T. Dewing. Dec. 10, 1945. 604,901.

Insolubilisation of N-alkenoxy-methyl polyamides.—Imperial Chemical Industries, Ltd. Dec. 8, 1944. 604,902.

Synthetic resin compositions for low pressure paper base laminates and wood surfacing.—American Cyanamid Co. March 2, 1945. 604,903.

Polyhydric phenol-aldehyde resins used as adhesives in bonding plywood and the like.—Pennsylvania Coal Products Co. Oct. 19, 1943. 605,186.

Polyhydric phenol-formaldehyde resin adhesives.—Pennsylvania Coal Products Co. July 15, 1943. 605,187.

Devices for the production of pressure impulses for transmission through a liquid aqueous medium.—I.C.I., Ltd., E Jones, and A. J. Lowe. Sept. 6, 1944. 605,189.

Manufacture of vat dyestuffs.—Soc. of Chemical Industry in Basle. Jan. 12, 1944. 604,916.

Manufacture of azo-dyestuffs.—Soc. of Chemical Industry in Basle. March 28, 1944. 604,921.

Condensation of metallic vapours.—Soc. d'Etude pour L'Industrie due Magnesium. April 4, 1944. 604,924.

Insecticidal compositions containing halogen-containing organic compounds and the treatment of materials therewith.—Geigy Co., Ltd., I. E. Balaban, and F. K. Sutcliffe. April 28, 1945. 604,926.

Pressure die-casting machine.—Plasco, Ltd. Jan. 26, 1945. 605,203.

Method of improving the adsorbent properties of alumina.—Compagnie de Produits Chimiques et Electro-Metallurgiques Alais, Froges & Camargue. Oct. 12, 1944. 604,947.

Manufacture of agglomerated products from refractory materials.—Soc. Anon. des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey. July 9, 1941. 605,215.

Apparatus for mixing vaporised fuel with coal gas.—T. W. Ward, Ltd., and B. M. Lovey. Dec. 10, 1945. 604,953.

Process for the catalytic treatment of hydrocarbons.—C. Arnold. (Standard Oil Development Co.) Dec. 10, 1945. 604,959.

Production of magnesium thiosulphate and magnesium oxide from dolomite.—American Zinc, Lead & Smelting Co. Jan. 19, 1945. 604,976.

Manufacture of highly polymeric linear esters and the production of filaments, fibres and the like therefrom.—I.C.I., Ltd., J. G. Cook, J. T. Dickson, A. R. Lowe, and J. R. Whinfield. Dec. 11, 1945. 604,985.

Method of making cellular synthetic resin material.—United States Rubber Co. Feb. 2, 1945. 605,023.

Process for the manufacture of halogenated hydroxybenzamides of the hetero-cyclic series.—P. May. (Sandoz, Ltd.) Dec. 12, 1945. 605,031.

Gas turbine plant.—English Electric Co., Ltd., and E. G. Sterland. Dec. 13, 1945. 605,080.

Gas turbine plant.—English Electric Co., Ltd., and E. G. Sterland. Dec. 13, 1945. 605,081.

Acetylene generators.—Volcan Soc. Anon. June 15, 1945. 605,087.

Method of regulating a gas turbine plant.—Maschiuenfabrik Oerlikon. Feb. 9, 1945. 605,088.

Lining tanks for the storage of acids or like liquids.—Semtex, Ltd., L. H. Griffiths, and P. A. Chennell. Dec. 14, 1945. 605,094.

Aluminium base alloys.—T. F. Bradbury. Dec. 14, 1945. 605,095.

Production of perforated sheets of thermoplastic resin compositions.—I.C.I., Ltd., and W. E. F. Gates. Dec. 14, 1945. 605,105.

Production of substituted tetrahydropyrans.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Dec. 14, 1945. 605,107.

Manufacture of trichloromethyl diaryl methanes.—E. I. Du Pont de Nemours & Co. Dec. 14, 1944. 605,108.

Gas turbine power plants.—A.G. für Technische Studien. Dec. 29, 1944. 605,116.

Silicone resin compositions.—British Thomson-Houston Co., Ltd. Dec. 23, 1944. 605,218.

Manufacture of vat dyestuffs.—Ciba, Ltd., and W. W. Groves. Dec. 18, 1945. 604,981.

Dyestuff preparation for printing or dyeing textile fibres.—Durand & Huguenin, A.G. April 2, 1941. 605,314.

Alloys of the aluminium-nickel-iron base type, and methods of improving aluminium-nickel-iron base type alloys.—Indiana Steel Products Co. July 8, 1943. 605,436.

Steel articles for use at low temperatures. —Electro Metallurgical Co. Jan. 16, 1943. 605,440.

Silicate plastics and methods of preparing them.—Haveg Corporation. April 13, 1943. 605,441.

Preparation of diaryl mercury compounds.—F. J. Sowa. June 4, 1943. 605,442.

Insecticidal detergents, the application thereof and materials or articles treated.—J. R. Geigy A.G. Oct. 13, 1943. 605,317.

Resolution of racemic α-hydroxy-β-β-dimethyl-γ-butyrolactone.—Merck & Co., Inc. Nov. 27, 1943. 605,444.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,445.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,446.

Polymeric materials.—E. I. Du Pont de Nemours & Co. Nov. 19, 1943. 605,447.

Electro deposition of manganese.—Electro Manganese Corporation. Feb. 1, 1944. 605,448.

Manufacture of substituted aryltrihalogenoethanes.—Geigy Co., Ltd., I. E. Balaban, and F. K. Sutcliffe. Dec. 8, 1944. 605,318.

Calcium alginate containing jellies.—H. F. Angermeier. March 5, 1945. 605,455.

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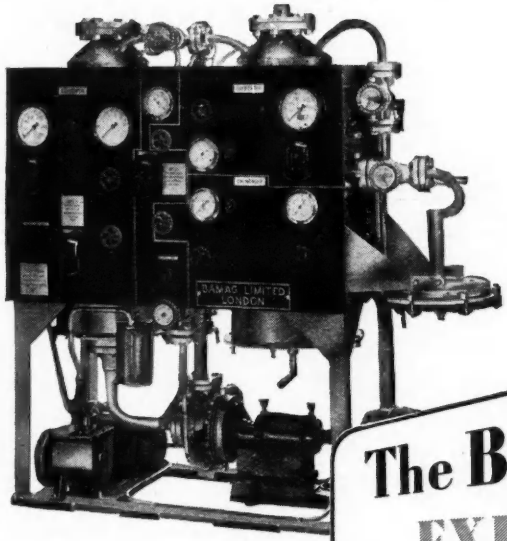

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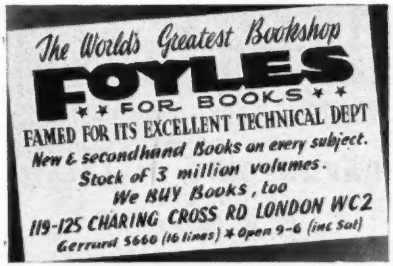
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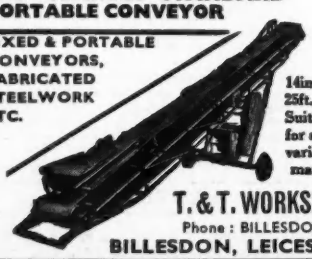
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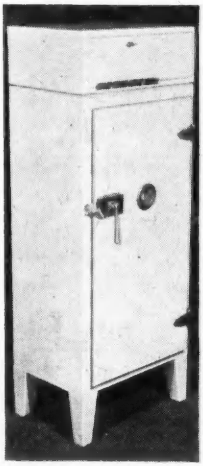

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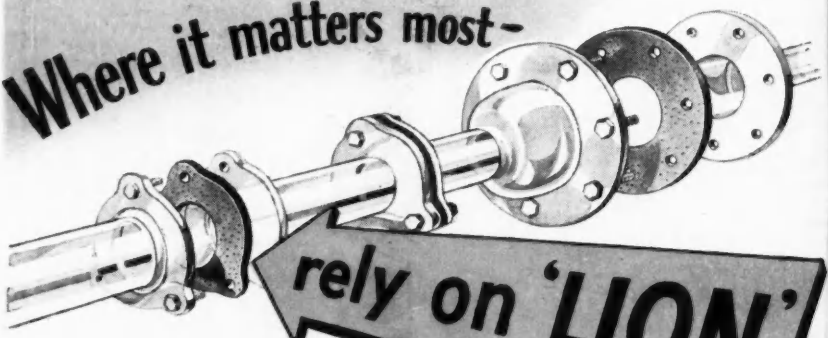

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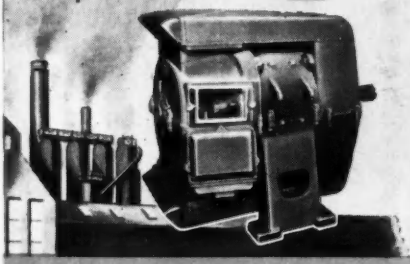

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